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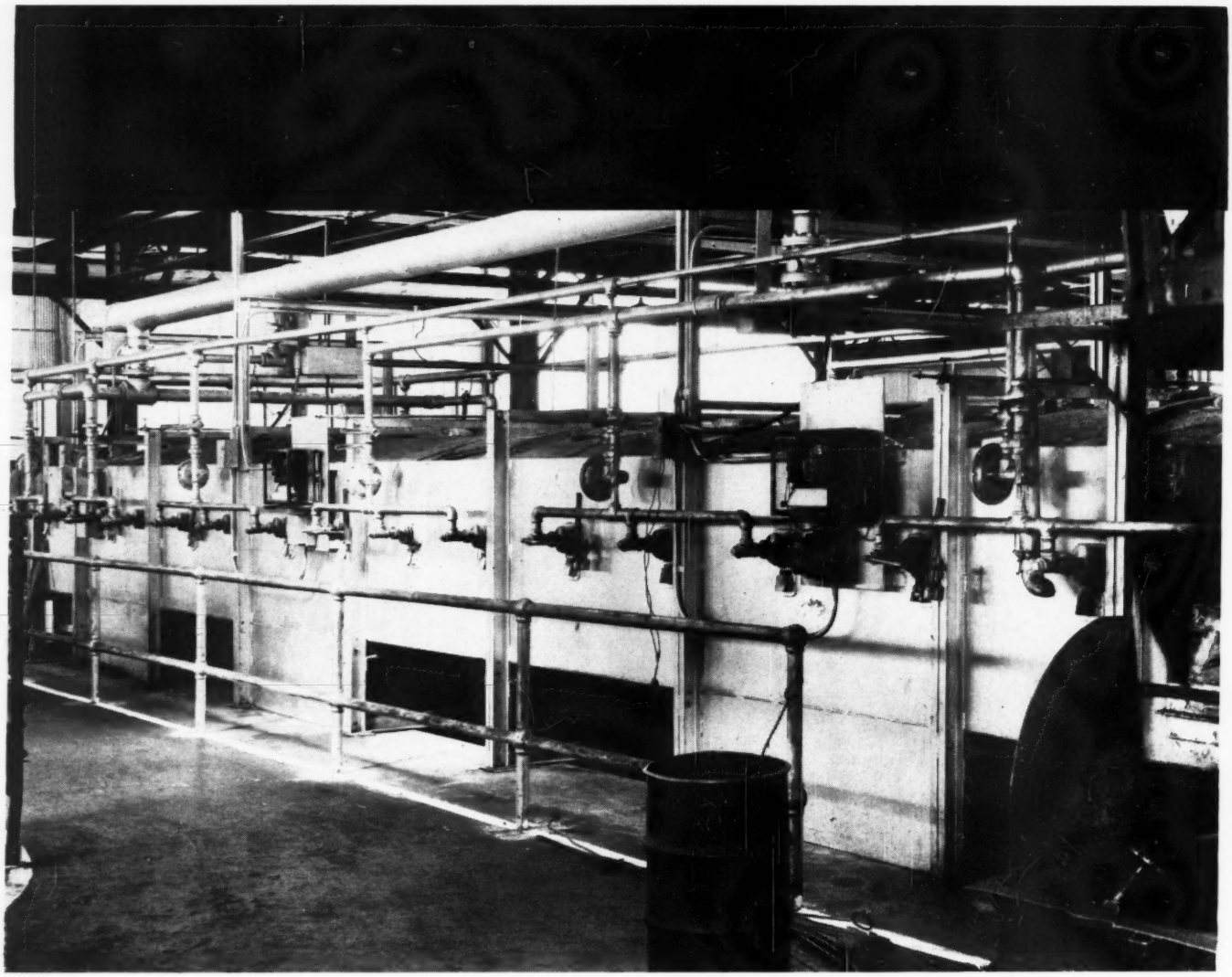

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A PROMINENT gas and electric utility in a large mid-western industrial city experimented with copper tubes for service lines. Test installations were made in various locations under differing conditions of soil corrosion. Accelerated corrosion tests were also conducted, and carefully kept records revealed the following:

1. Even in cases of bad soil conditions, expected service life of copper tubes could be conservatively computed in decades instead of years.

2. Based on such computation, cost of copper tubes represented far-reaching economies in total costs of material, labor and re-paving on main to curb services.

3. In many instances, smaller diameter copper tubes were fed through existing lines, eliminating entirely the high cost of removing and replacing the latter.

As a result of these findings, the utility in question had installed prior to the war well in excess of 500,000 feet of 1¼-inch and 2-inch copper tubes.

An interesting sidelight on this history of money-saving operation is this: Company executives feel that equally important is the improvement in public and customer relations resulting from minimizing the need for tearing up lawns and streets.

Similar developments in the case of other utilities have been closely followed by The American Brass Company. Gas distribution engineers are invited to write for information on the use of Anaconda Copper Tubes in gas service. 4590

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Twenty-First Year of Publication

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Publication Office: **LOS ANGELES 14, California, 1709 West Eighth Street, DRexel 4837.**

Branches: **NEW YORK 17, 50 E. 42nd Street, MUrray Hill 2-4504; WASHINGTON, D. C., 306 National Trust & Savings Building, District 0215; CHICAGO 3, Illinois, 1064 Peoples Gas Building, HARrison 6634.**

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June, 1945. Volume XXI. Number 6. GAS is published monthly by Western Business Papers, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: 25 cents the copy; two years for $3; $2 per year; Canada $3 per year. Entered as second-class matter August 20, 1936, at the post office at Los Angeles 14, Calif., under the Act of March 3, 1879. Member: Audit Bureau of Circulation; Associated Business Papers, Inc. Publishers: BUTANE-PROPANE News; Handbook BUTANE-PROPANE GASES; THE BOTTLED GAS MANUAL; WESTERN METALS.

GUEST EDITORIAL

MOUSETRAPS AND MERCHANDISING

By D. A. HULCY

President, Lone Star Gas Company and Chairman, A.G.A. Committee on Research, Advertising, and Promotion

THE world no longer beats a path to your door to buy a mousetrap. It must be convinced that yours not only is a superior mousetrap but also that it completely fills a particular need. Merchandising is needed to sell your mousetrap, or your fuel gas, or your gas appliances, instead of your competitor's.

Sales promotion is one of the most important factors in merchandising. It is the coordinating effort that concentrates the individual components of a merchandising plan into a force that dispells buyer resistance and lethargy and stimulates a want and a need for a product.

The gas industry, under the sponsorship of The American Gas Association has launched an intensive program of research, advertising and sales promotion activities to prove to Mr. and Mrs. America that gas is the ideal fuel for home and industry. More than 20,300,000 home customers now are convinced of this fact. We must acquaint industry and business in general with the aims of our program.

The expanded National Advertising campaign now is operating at full speed. Housewives are being told in the pages of leading women's magazines of their emancipation from drudgery with the New Freedom Gas Kitchen. Research projects are now under way and the program of publicity has started. Now is the opportune time for the Sales Promotion program to be put in operation.

The president of the American Gas Association has appointed a group of highly qualified executives to serve as the committee to direct this Sales Promotion program. I have been honored with the privilege of serving as chairman of that committee. Its membership announced elsewhere in this magazine, includes the chairman of each Association group administering the advertising, publicity and promotional activities of the Association, as well as members-at-large from the gas industry.

While the committee is yet too young to have planned its direct course of action, it is agreed that its fundamental objective is to correlate the various promotional activities now being carried on in the industry.

Research projects under the program will improve the utilization of gas in domestic and industrial fields. Advertising and publicity will tell millions of prospective consumers of the superiority of gas as a fuel for cooking, for space and water heating, for refrigeration and for air conditioning in the home; and for commercial cooking, for rapid heating and drying and other new scientific uses of gas in industry.

Gas companies and appliance manufacturers will spend about $25,000,000 a year in normal times in advertising and promotional activities. Manufacturers of gas equipment and related products will conduct extensive promotional activities. The American Gas Association will spend more than $1,400,000 a year for the next three years under its research and promotional plan. Separately these activities are powerful forces. Unified and coordinated, they will be a dominant influence in creating a desire to use gas and to own modern gas appliances.

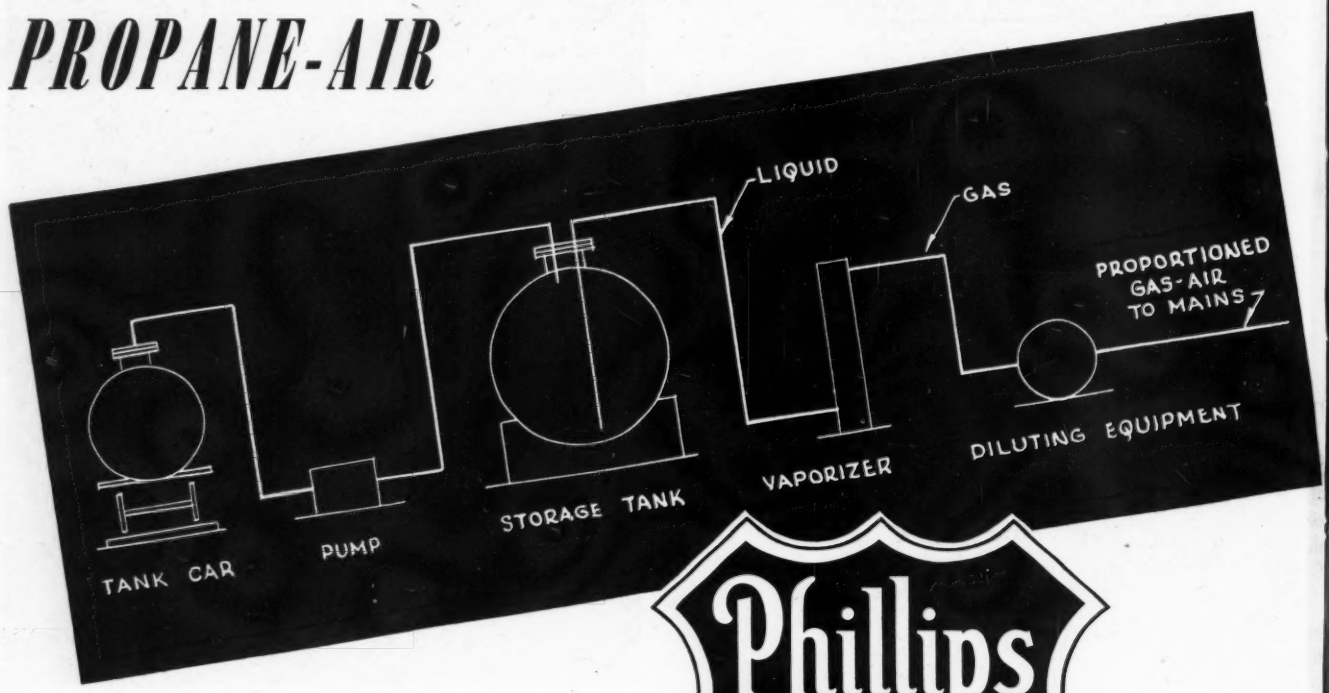
It will be the objective of our Sales Promotion Committee to convert that desire into sales by coordinating every facility offered by the gas utilities, the manufacturers and the American Gas Association. Through this coordinated effort the utmost in results from these separate activities can be achieved.

No better expression of the aims of this Committee can be offered than that in the research and promotional plan of the Association which stated:

> ***"The attainment of the objectives covered by the recommendations of the Postwar Planning Committee will depend upon the concerted efforts of the entire gas industry. Close coordination of the efforts and full use of the resources of the utilities and manufacturers will be required so that a strong promotional program may be developed which will permit the industry to realize the full benefit of its appliance research program and meet the competition of other services."***

The Sales Promotion Committee of the American Gas Association will devote all of its efforts to achieving that objective.

You Can ECONOMICALLY CONVERT Your Gas Plant to *PROPANE-AIR*



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IT'S a simple, money-saving program to convert your water gas and coal gas plants to automatic propane-air distribution. But this is only one of several important ways gas utilities use Phillips Propane and Butane. Peak shaving, cold enrichment, and under-firing of coke ovens are other means of utilizing these "natural gases." Regardless of which phase interests you, a Phillips representative will gladly and without obligation give engineering counsel based on our many years of experience.

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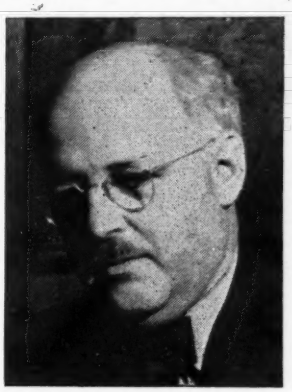
THERMALLY THINKING

By ELLIOTT TAYLOR, Washington Editor

Backseat for Bureaucracy

THERE is a delicate vein of poetic justice discernible in the present prospect that the hearings before the Senate's national oil policy committee will develop into an investigation of the natural gas industry that may eclipse completely the famed but faltering attempts of the Federal Power Commission to push its own Docket G-580 out into the spotlight.

This unseemly offhand announcement of its intention to conduct such an investigation, made during the Memphis hearings, was taken at the time to indicate that the power bureau was trying to crowd in ahead of any congressional committee that might be authorized and appointed for that purpose. The Overton resolution then pending before the Congress would have provided the commission with specific authority and the funds to go ahead with such a probe; but the commission apparently couldn't wait to discover whether or not it was the will of Congress that it undertake the job. Since the Overton resolution never did pass, it may be that the commissioners had cannily assayed their chances there for just about what they were worth.



Elliott Taylor

Under the naiive assumption that the natural gas and the petroleum industries would obligingly provide agenda for their own inquisition, the hearings were scheduled to start in May of this year. But as the deadline drew near and only the natural gas obstruction groups, coal and railroads, had submitted any helpful suggestions, and since the commission had been unable to assemble a staff possessed of the modicum of competence that would have sufficed, the whole project was waved airily aside until "late summer or early autumn . . . to give *state conservation authorities* ample time to prepare" for the hearings.

The reluctance of natural gas, of the petroleum industry and of the natural gas producing states to participate in the hearings has been apparent from the outset, as have the reasons for their mistrust of the gaudy blandishments of the commission. Since the predetermined end product was to be a case indicating the need for greater federal control over both state and industry affairs there was neither reason nor justification for those who were to be the victims of the commission's plunge for power abetting it in its ambitious machinations.

But we are convinced that a complete investigation of the whole natural gas industry, with an eye to the establishment of a rational fuel policy as respects coal, oil, gas and power is inevitable, and we believe that it is to the best interests of the natural gas industry to cooperate fully with whatever agency is authorized by Congress to undertake that investigation provided it is competently planned and fairly conducted in an effort to arrive at the facts, and not merely to prove a dubious point.

The preliminary outline of activities of the oil policy committee, under Senator Joseph C. O'Mahoney indicates that the scope of the investigation will include all of the information that can be accumulated on natural gas as well as on oil. Certainly as far as natural gas reserves and production are concerned, they will have to be considered together with those of oil if any adequate picture of the potential recoverables, with a minimum of economic waste, is to be completed.

And since the whole question of conservation of both oil and gas is then tied up with the economics of gathering natural gas produced in association with oil, and taking it off to a profitable market, the committee cannot complete its analysis of either industry until it has explored the effect of arbitrary end-use prohibitions on conservation practices in the fields.

Under these circumstances, it is apparent that the practical and enlightened attitude of natural gas and of the state conservation commission should be one of complete and open cooperation with the O'Mahoney committee. Even in his release of the preliminary outline of the proposed investigation, the Senator indicated that the whole procedure would be subject to change as expediency and the national interest might dictate. This provides, in our opinion, an opportunity and an invitation as well for every factor identified with natural gas to prepare and produce the evidence that it would have introduced into the formation of a national fuel policy.

The Petroleum Industry War Council has already prepared a comprehensive statement of industry viewpoint in its Supplement to the Preliminary Report on National Oil Policy. The principles were subsequently adopted in resolutions by the American Petroleum Institute, the Independent Natural Gas Association of America and by the American Gas Association. Competent witnesses will be given an opportunity to present the substantiating facts on which these organizations have based their statement of policy, and it is to be hoped that the evidence then presented will be at once all conclusive and convincing.

It is entirely within the range of possibility that a successful and complete presentation of the natural gas

story before the senate committee will obviate completely the necessity for any duplicate endeavor on the part of the Federal Power Commission. Such a consummation should be eminently satisfactory to all of the fuel industries and to the commission as well, since all must recognize that in the final analysis Congress and Congress alone must decide the extent and the degree in which governmental intervention in the conduct of private industry is necessary in the public interest.

Waste and Winkler

IT is generally considered as undebatable that the profligate and wanton waste of natural resources is a short sighted, anti-social, uneconomical policy; and since we are always to be found on the affirmative side of undebatable propositions, we hasten to express our complete agreement and accord with this one.

But when the subject gets around to a definition of what constitutes waste we are wont to cautiously withdraw since here is a subject on which even the experts are in a state of constant and wordy warfare.

Louisiana, let us say, or Texas or any other large gas producing state has a lively interest in seeing that its fuel is not wasted, and it is not uncommon for public opinion in such states to be prodded along into the acceptance of the premise that there is something wasteful about selling any gas outside of the state to industries that might be induced to move in and use the fuel on the home grounds. The coal industry, complacently referring to its 3000-year supply of reserves in place, not infrequently drops a sympathetic tear on the neck of natural gas conservers who seek to conjure up gas-stay-at-home legislation, or to hamper pipe line movements. But since the coal industry wants all of the fuel business for itself, it is doubtful whether it anticipates any great migration of industry into the gas producing states. Coal's practical outlook is that if the transmission of gas from one state to another can be curtailed, that is just so much natural gas that won't be used in competition with coal.

This being the case, the duty the muddlers of today owe to unborn generations is then set up on its high moral pedestal, and we are asked to contemplate the spectacle of a society of tomorrow with all of its gas fuel gone, and its harried housewives and husbands reduced to the irksome necessity of shoveling coal.

Since we are completely sold on the manifold blessings that will be showered on our descendants in the world of tomorrow, we are naturally anxious to see that that bounty is not marred by the absence of a plentiful gas supply. But from the way it looks now, we aren't at all convinced that it will have to come from Texas or Louisiana or from any other of the big present producers of natural gas. For it is entirely possible that the gas of tomorrow will be produced in the very coal regions that are now fighting so vigorously to exclude it.

The Winkler process, about which little is being said for public consumption at the present time, shows almost visionary promises according to its enthusiastic proponents. They will tell you that a 1000-Btu gas will one day be made for as low as 15c per thousand from coal selling at present day prices. This sounds fantastic, but is it fantastic enough to be dismissed as a complete and final impossibility? Is it not a question that must be reckoned with by any state that would refuse, if it could, to permit, the exportation of 5c gas into a long distance transmission system? If gas could be manufactured for 15c or 20c or even 25c in the coal fields of Pennsylvania, how much demand would there be for five cent gas in Texas?

Other manufacturing processes, such as the Russian experiments in the underground gasification of coal are also to be reckoned with. Given a cheap and as yet undeveloped source of oxygen to raise the heat content of gas thus made, who can say what new low costs might be arrived at.

We don't mean to infer that the gas reserves are to be blown to the air in sheer despair because of the threats to the distant markets. But if the day should roll around when Texas could keep its gas at home simply because it couldn't compete with gas manufactured away off there where it is needed, then what price conservation as far as the defenders of the twentieth century Alamo are concerned?

It all seems to prove that when the body politic starts tampering with the orderly economic processes, it had better make arrangements to shut off scientific investigation as well.

Gas is Gas

QUIET insistence by an increasing number of gas men that liquefied gas—propane and butane—be regarded as a legitimate and loyal member of the gas fraternity appears to be bearing fruit within the ranks of the gas utilities and the marketers of liquefied gases as well. Recently a committee representing the Liquefied Petroleum Gas Association's advertising committee met with the top flight national advertising committee of the American Gas Association to discuss the feasibility of a joint participation by each industry in the other's advertising activities. The results of the talks are said to be definitely indicative of a desire on both sides for close cooperation, and presumably each group will now go to its own membership seeking authorization to proceed with a definite plan.

We do not see how the gas utility industry can afford to remain aloof from liquefied gas any longer. The fear of combination utilities that butane or propane will appear as an ever increasing threat to their electrical departments is probably well justified. But that threat exists anyhow, and tactics of supression only create an atmosphere wherein the liquefied gas operators are spurred to greater competitive efforts, not only against the electric but against the manufactured gas territories served by non-cooperating gas and electric utilities.

Since it first came into popular use, liquefied gas has been freely available to expansion minded gas companies as a flexible peripheral territory, beyond the mains, fuel. It is the one thing that can safeguard for gas, new construction and residential developments beyond the reach of town distribution systems. Yet how few natural or manufactured gas executives had the foresight to appraise it for its great potentialities! Inter-industry cooperation now will be a definite step toward the realization of these benefits that the industry has deliberately denied itself for more than a decade. Such cooperation even now may go far toward expunging from the pages of gas history the record of executive shortsightedness that refused to believe these benefits when first they were made manifest to gas utility managements.

Highlights

Revocation of Order U-7 is not likely in the near future, but look for some relaxations in the next 30 to 60 days.

Leoard Macomber, AGAEM Washington representative, writes that the water heater order (L-185- will probably be revoked by July 1. With the cancellation of the copper order (M-9c), copper-dip tubes in automatic water heaters are now permitted.

L-23c covering gas cooking and heating stoves will not be revoked until the third quarter, although gas range production for the second quarter will probably reach 200,000 and should go to 250,000 in the third quarter. Oven heat control production for the second quarter should range between 150,000 and 175,000 units, should reach 400,000 in the third quarter barring difficulties in scheduling materials.

Orders revoked in recent weeks were: Manufactured gas (174); power boilers (299); furnaces (22); plumbing fixtures (42); furnaces, floor and wall (173); commercial cooking and plate warming equipment (182); cast iron boilers (187); copper (M9c); conversion burners, iron and steel (M-126); refrigerators (38).

The American Petroleum Institute has organized a Medical Advisory Committee as its first step in shaping API postwar activities to promote study of subjects involving medical problems peculiar to the petroleum industry.

In a booklet, "The Truth About Natural Gas," the Milwaukee Gas Light Co. summarizes the rate advantages to its consumers in the company's Zone 1 should natural gas replace manufactured. Present cost to a residential consumer with a range is $1.76 monthly as against $1.55 with natural gas or a decrease of 11.9%. Total annual bill for range, storage water heater, refrigeration, and househeating is now $125.80, with natural gas would be $90.46, or a decrease of 28.1%.

American Central Manufacturing Corp., Connersville, Ind. has a new dealer sales help in the form of a "Plan-A-Kit"—an adjustable, easily operated board upon which the customer's kitchen layout can be reproduced to scale in a matter of minutes.

The national policy on the conservation and utilization of natural gas declared by the Petroleum Industry War Council, in recognition of forthcoming hearings by the Senate or other Federal agencies, was endorsed May 25 by the A.G.A. The proposals approved advocate private ownership, State jurisdiction over conservation and waste, competitive effort with freedom of individual action in the search for new production, enactment or adaptation of State statutes to promote development of cycling repressuring projects. The report held that opposition to the export of gas from one state to another is without legal basis; that jurisdiction over production and sale at the point where its interstate movement commences must remain with State agencies; that end use should not be regulated since competition is the best arbiter in determining the best use of gas.

Domestic electric range manufacturers will be given priorities to turn out 102,000 units in each of the third and fourth quarters, almost tripling the 35,000 units approved for second quarter production.

According to a consumer analysis booklet published by *The Milwaukee Journal* the trend is heavily in favor of electric ranges in all income groups, particularly in the higher brackets. A total of 140,218 families, or 61.6% of all families in Greater Milwaukee, indicate that they would again buy gas ranges, compared to 86,726 families, or 38.1%, who would buy electric ranges.

WPB Order L-86, controlling the use of liquefied petroleum gases, which is administered by PAW, is still in force, and prohibits, subject to specific exceptions, the installation of liquefied petroleum gas equipment.

An order staying work on the extension of pipeline facilities of *Memphis Natural Gas Co.* between Monroe, La., and Memphis was signed May 22, by Judges McCord and Holmes of the U. S. Fifth Circuit Court of Appeals. The order, sought by the Louisiana Public Service Commission and the State Department of Conservation, would be in effect until disposition of the long-litigated case by the United States Supreme Court. The order again halts construction on a project approved by the Federal Power Commission last November.

Blaw Knox Co. will manufacture a "white glove packaged fuel" made of a combined anthracite and bituminous coal product under sponsorship of the Solid Fuels Administration, according to press reports. Composed of six 3-in. cubes wrapped in orange paper, the product will give maximum heat with a minimum of white ash, can be stacked neatly beside fireplaces, stoves, or furnaces without the usual attendant coal dirt.

More than 35,000 prospective home buyers in 138 cities have already attended free lectures given by the Home Planners' Institutes covering the construction, decoration, and equipment for the home. The Institutes are fostered by the National Retail Lumber Dealers Association, Washington, D. C., which has prepared a Manual for the purpose of providing the public with accurate information on postwar home building. H. R. Northup, Association secretary, predicts 1000 Institutes with over 300,000 people in attendance by the end of the year.

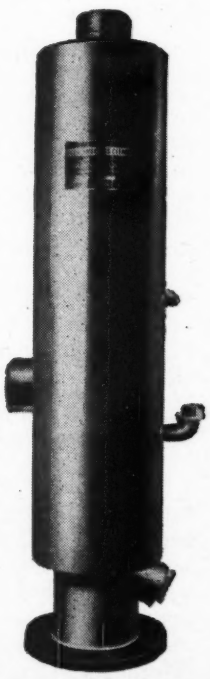
GAS MAIN DUST MADE THE DIFFERENCE IN THESE REGULATOR VALVES

Ask for Bulletin No. 1869 concerning Blaw-Knox Gas Cleaners and installations.

Notice the deep irregular erosion cutting into the valve face and the lower part of the valve stem on the left above, compared with the normal shape of the valve at the right which has been in use in a clean gas stream.

Gas main dust is ruinous to regulator valves, meters and more expensive apparatus. It is responsible for rising costs for maintenance, replacements, service complaints and "unaccounted for" losses.

The cure is simple, practical and positive. Blaw-Knox Gas Cleaners installed at strategic points in the system, remove gas main dust. CLEAN GAS PAYS PROFITS.



Blaw-Knox "K" Series Gas Cleaner

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BLAW-KNOX GAS CLEANERS

KITCHEN VENTILATION

Using Products of Combustion for Removal of Cooking Greases and Odors

By H. A. BROWN

Rochester Gas and Electric Corporation

WHY has kitchen ventilation become one of the major items in modern kitchen planning? Ventilation of kitchens was always desirable. Today it has become a necessity. Kitchens have been made smaller and more compact so the housewife may do her work more efficiently. *But,* the comfort of the housewife has been ignored. Surplus heat and cooking odors have become more and more objectionable. It is essential that the kitchen be properly ventilated if we are to have a truly modern kitchen.

There is a tendency on the part of a large number of people to consider the necessity for ventilation as dependent upon the fuel used. The electric range advertising has built up in the public's mind that to have a cool clean kitchen the modern kitchen must have an electric range. Actually the soil in the kitchen is the result of the deposition on the walls and cabinets of condensed oils and fats distilled out of the food during the cooking process. The type of fuel used has nothing whatever to do with it. The effect of heat on the food being cooked is the same whether that heat is produced by wood, coal, oil, electricity or gas.

Slow vs. Fast Cooking

The amount of heat used does have an effect on the quantity of oils and operation. Thus high temperature cooking will produce greater quantities of greasy vapors and more resultant grime than low temperature cooking. Electricity is a more expensive fuel for cooking and in order to keep fuel costs down low temperature cooking is almost a necessity. Gas, with large quantities of heat available at low cost does not encounter this limitation and the housewife cooked in the manner she desired. Invariably this was high temperature, short time cooking. This difference in cooking methods accounted for the apparent cleanliness of electric cooking. In recent years studies have been made which show very defnite nutritional advantages from low temperature cooking and this is now the universally recommended way of cooking regardless of fuel or costs. However even with low temperature cooking, and regardless of fuel, there are many cooking operations which create dirt and grease.

If these oil and grease vapors could be retained in the vapor state the problem of their removal would be greatly simplified. The walls of the kitchen are relatively cool and if the vapors are allowed to come in contact with these cool surfaces the oil and grease will condense on these surfaces. The condensing of vapors on cool surfaces is a common process. All are familiar with it.

This explains one of the basic faults existant in the old fashioned methods of kitchen ventilation. The vapors were discharged into the room and then an attempt was made to recapture them by means of a hood or an exhaust fan. The hood presented a very efficient condensing surface and as a result the grease and grime collected on the hood and presented a very unsightly appearance and a definite fire hazard. The housewife justifiably would not tolerate this unsightly device in her kitchen and the hood idea has passed out of the picture.

The ventilating fan in the wall of the kitchen was only slightly better than the hood. If it was located immediately over the range where it would do the most good it soon was filled with grease and dirt and was just as objectionable as the hood. If it was located in a wall remote from the range it remained relatively clean for the simple reason that all of the greasy vapors had condensed out on the cool walls as they travelled from the range to the fan. The fan did a very efficient job of distributing the grease all over the kitchen walls.

Previous ventilation systems also had one other outstanding defect. Due to the fact that the vapors were released into the room it was necessary to remove large quantities of air from the kitchen in order to capture the diluted vapors. For every volume of air removed from the house by the ventilation system an equal volume must be drawn in from outside. This meant that in the wintertime too much cold air was drawn into the house and too much hot air was drawn in in the summertime.

Essential Features

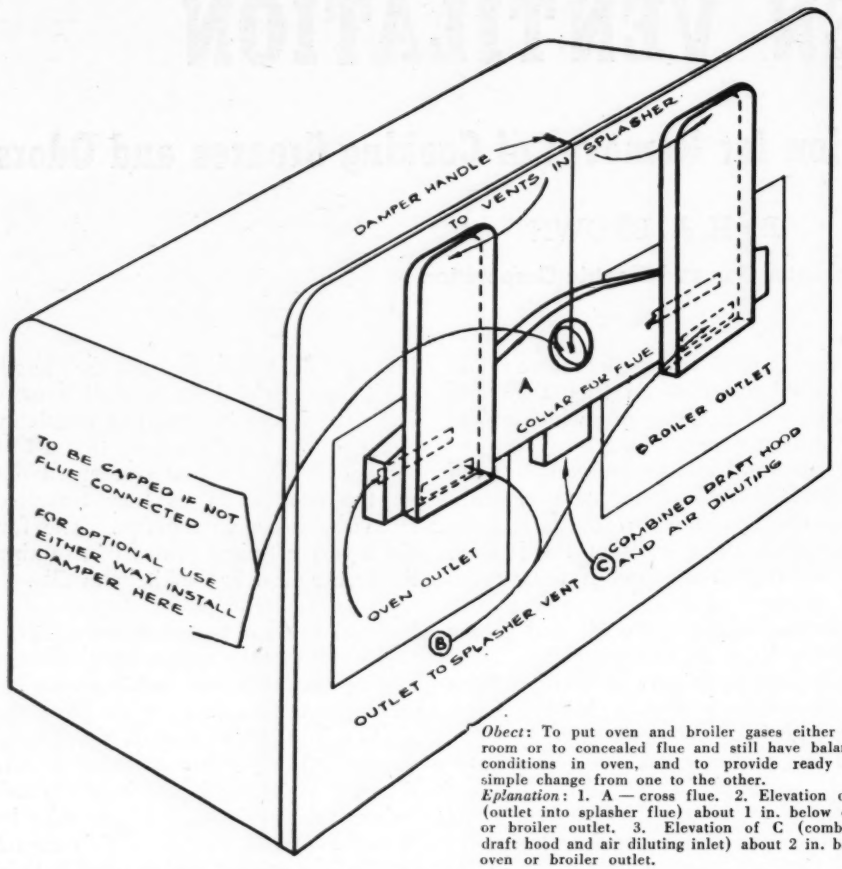
Some of the essential features of an efficient yet easily applicable method of kitchen ventilation are listed in Table. 1.

It was with the points in Table 1 in mind that we developed the ventilating system and have installed it in a number of Rochester homes and have placed it in our display kitchen on our main office floor. Four of the field installations were placed in ex-

SINCE THE PRODUCTS of combustion can be the vehicle for removing the greases of cooking in an uncondensed form, it has become increasingly apparent that a gas range, properly installed, can provide a cleaner, cooler kitchen than can an electric range. The homes of today and tomorrow will require cleanliness in the kitchen, irrespective of the fuel used. If kitchen ventilation is attempted with the electric range, the disposition of grease becomes a problem. Thus, the gas industry has a great opportunity to champion kitchen ventilation.

Research and developments (some of which are of a startling nature) on the problems of proper kitchen ventilation are already under way. It may take some time before final details are worked out. However, in the meantime the program developed by the Rochester Gas and Electric Corp. provides a means of kitchen ventilation that is capable of adaptation to present range models—using existing available materials—that does not involve other facilities in the kitchen and which is also adaptable to modernization of old kitchens as well as to new construction. This development will accomplish substantially all of the objectives of a kitchen ventilation program. While it is true that later research and development may improve on it, it does mean that such service can be available in the immediate postwar period, so that the industry can begin to talk about it.

Mr. Brown's paper was presented before the Florida-Georgia Meter Association meeting at Daytona Beach, May 18 and 19, 1945. An abstract is presented herewith.



Obect: To put oven and broiler gases either into room or to concealed flue and still have balanced conditions in oven, and to provide ready and simple change from one to the other.
Explanation: 1. A — cross flue. 2. Elevation of B (outlet into splasher flue) about 1 in. below oven or broiler outlet. 3. Elevation of C (combined draft hood and air diluting inlet) about 2 in. below oven or broiler outlet.

FIG. 1. Rear of range for universal application with or without flue.

isting homes and two were installed in new homes during construction. No two of the jobs were alike and to date four different makes of ranges were used. The system is flexible enough to meet almost any conceivable situation and our field experience has been excellent. All of the installations are giving complete customer satisfaction.

Fig. 1 shows the changes to the back of the typical gas range to enable it to be flue connected or not, at the will of the customer. Necessary changes can be made to contemporary ranges with relative ease.

Installation Layout

Fig. 2 shows the layout of installation as it has been applied in our system. The oven and broiler are connected to the ventilating duct through a damper. If the damper is closed the oven and broiler products of combustion and cooking vapors are expelled into the room via the backsplasher vents in the normal manner. The wall grille above the cooking top withdraws the products evolved on the top units. The blower is located in the basement and the discharge is just above the ground level.

Fig. 3 shows in detail the elevation of the ventilating duct system. We have had this system in operation in one consumer's home for over four years and in the second consumer's home for three and one-half years. The chief item which we were originally concerned about was the problem of grease. We were of the opinion then that the blower blades would probably collect grease and possibly the duct system itself, but oddly enough we were wrong. There just isn't any grease condensing in any part of the system. We have inspected these installations periodically but have never cleaned them and to date there is no grease accumulation anywhere.

The answer, we now know, is due to the fact that the hot products of the gas combustion act as the vehicle to carry the greases in the vapor state completely through and out of the ventilating system. To keep the temperature of the ventilated products up we have used an insulating type duct. When the oven or broiler is lighted for preheating the inner surface of the duct is warmed and subsequently when the cooking operation is carried on the greasy vapors do not strike cool surfaces which would lower their temperature to below the dewpoint.

Display Kitchen

During last summer our Home Service Department built on the main business floor of our main office building a complete display kitchen. This kitchen was to be a place where all the latest kitchen appliances both gas and electric could be displayed in actual use in a modern kitchen arrangement. It was a four-walled kitchen complete in every detail so the housewife would not have to use any imagination as to what the third wall and ceiling would look like.

It was decided to put a ventilated gas range installation into this kitchen. Frankly, the Home Service girls at the beginning were not very enthusiastic about the potential interest in a ventilation system. However, since the opening of the kitchen to the public the first of last September to

TABLE 1. ESSENTIAL FEATURES OF KITCHEN VENTILATION

1. **The system should not require major changes in gas range design or house construction.**
2. **It must be readily adaptable to any range in existing homes, or for installation during construction in new homes.**
3. **Cooking performance of the range must not be adversely affected.**
4. **The system must catch the cooking vapors at their source before they are diffused throughout the room. In this way the system will be operating most efficiently, will require the movement of only small volumes of air, will keep initial investment and operating costs down.**
5. **The system should keep the vapors as warm as possible to prevent condensation until after the vapors are out of the house. In this respect the hot flue products of the gas range resulting from the burning of the gas may be used as the vehicle for removing the vapors before they condense. In this way we utilize and make a virtue of what used to be the gas industry's bugbear—removal of the products of combustion.**
6. **The housewife must have complete control over the ventilating system. She should be able to have the heat from the oven discharge into the room or into the ventilating duct as she desires. There are certain cooking operations, such as baking cakes or potatoes, which do not involve the production of oil and grease vapors. In the cooler months of the year the heat resulting from such cooking processes may be a very desirable addition to the house heating.**

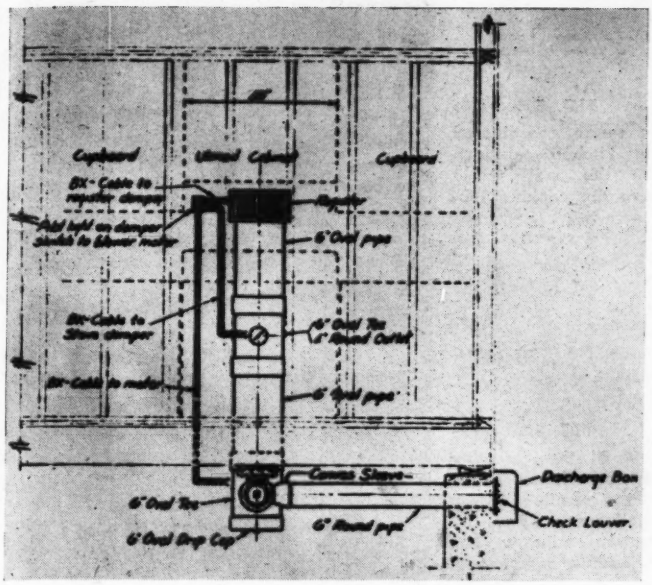


FIG. 3. Kitchen ventilation—typical elevation of down draft system.

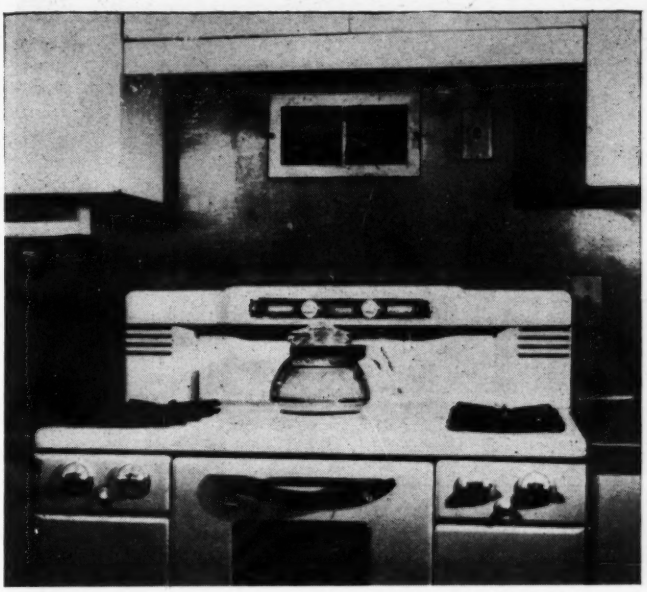


FIG. 4. Closeup of the range. Note the damper control at rear center of backsplasher.

May 1st, 24,250 people have visited the kitchen. This is remarkable because we have no merchandise on display or for sale and through an arrangement with the local banks in the city our customers may pay their gas bills at any bank and therefore do not have to come into our main office.

High Consumer Interest

To the first 10,000 people we gave cards upon which were some questions regarding the kitchen. No signature was required on the card. The first question asked was, "What features do you like most?" It is interesting that the largest percentage of replies liked the ventilation system the most. This was revealing to us because we thought perhaps some other feature, such as labor saving devices, lighting, special designed cabinets, dishwasher, etc., would get the first position. Then we asked, "How Does the Range Ventilation appeal to you? Not interested— So-so— Very much—." 94.3% answered Very much, 4.2% So-so and 1.5% Not interested.

The Ventilation System has stolen the show, and our Home Service Department people are all very enthusiastic of the potentialities of Kitchen Ventilation. They have become aware of the tremendous interest on the part of the public and just what the ventilation of the kitchen means to the housewife.

Fig. 4 is a closeup of the range showing the wall grille above the cooking top. Fig. 5 pictures an interior with the range coordinated with the kitchen cabinets.

The ventilating duct is shown in Fig. 6. The inspection window has not had to be cleaned, showing the importance of connecting the oven and broiler direct to the ventilating duct.

Kitchen Planning Service

We have set up a Kitchen Planning Department which will advise the customer regarding layout and arrangement of their proposed kitchen whether it be for new construction or remodeling. To date there have been 10 actual installations which are in use. Eighteen additional complete layouts made and furnished to the customers who are waiting for materials, and a great potential interest in the program is manifested in many ways.

Two men, assigned to this task, work in conjunction with the Home Service Department. A standard set-up has been devised which is adapted to the actual conditions of the home, blueprints are drawn and turned over to the customer with a letter of transmittal in which the names and addresses of two contractors are given who have been instructed in the principles and methods of installation. The customer, however, is at liberty to have the installation made by anyone and the drawings are in sufficient detail to enable any contractor to properly install the system.

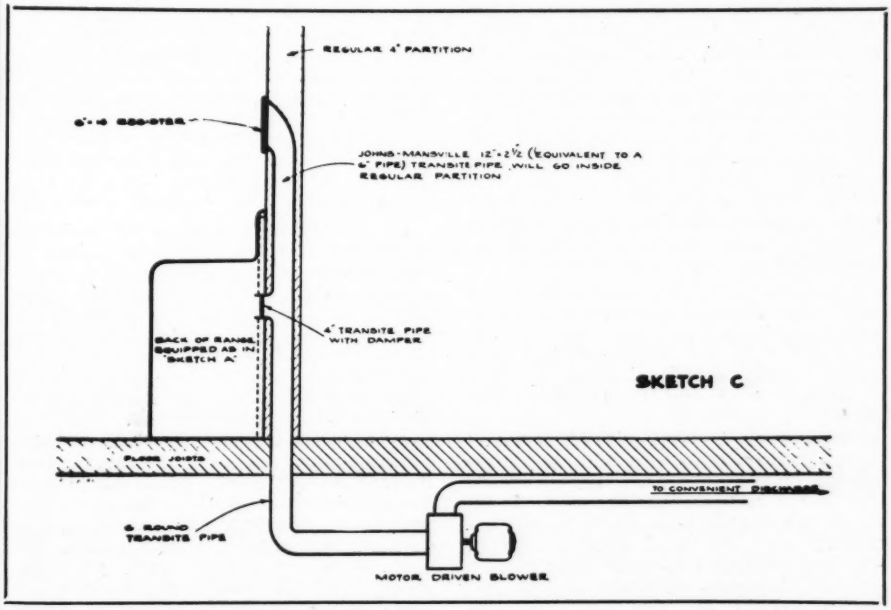

REGULAR 4" PARTITION
JOHNS-MANSVILLE 12"×2½" (EQUIVALENT TO A 6" PIPE) TRANSITE PIPE WILL GO INSIDE REGULAR PARTITION
4" TRANSITE PIPE WITH DAMPER
SKETCH C
TO CONVENIENT DISHWASHER
MOTOR DRIVEN BLOWER

FIG. 2. The kitchen ventilation system. Motor is started and stopped automatically when oven or broiler gas key is operated. Blower can also be operated manually with switch (equipped with signal light) beside range.

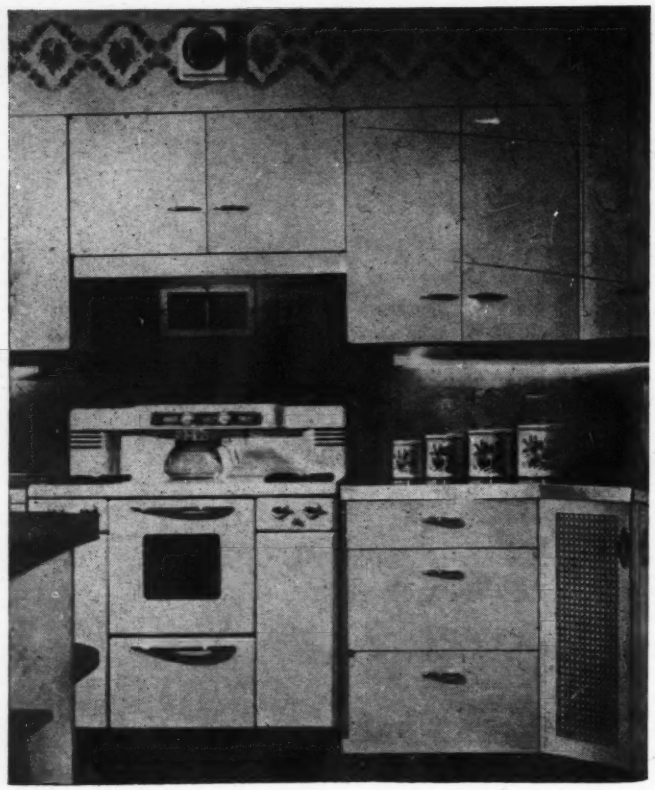


FIG. 5.
The range coordinated with kitchen cabinets. Note the wall grille above the cooking top.

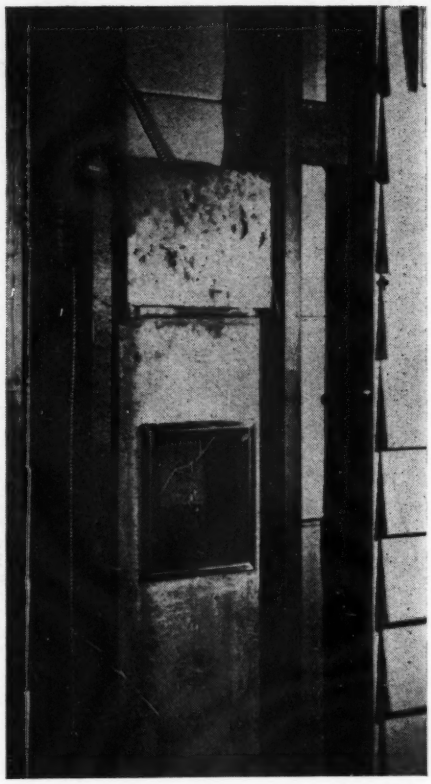


FIG. 6.
View of the cut-away rear of the house showing the ventilating duct installation. The inspection window has not had to be cleaned, showing the importance of connecting the oven and broiler direct to the ventilating duct.

This plan has been very satisfactory to date and when materials and building is resumed we anticipate a very heavy spurt in the number of requests for this service.

To get this system to the point where it will be all ready to go we have obtained two range manufacturers who will equip certain models of their first production with the necessary back, damper, etc. to apply to this system. Then to take the ventilation from the range to the outside of the house we have a manufacturer producing a "package unit" which will have the blower unit, wall grille, outside discharge hood, switches, etc., all wrapped up complete to do the complete job with the exception of the connection wiring and the transite pipe which can be procured locally practically anywhere.

Ready for Action

This system is designed to give us immediately the method and materials to be able to deliver when the go ahead signal comes. We do not have to wait for postwar developments. The last 1942 models of ranges may be readily adapted with but small changes to the range back. We know that consideration is being given to new designs for postwar ranges which will eliminate the need of placing the ventilating duct in the wall behind the range—this will be a part of the range and all that will be necessary to install the complete system will be to cut a hole in the floor under the range, connect the blower and discharge duct on the joists in the basement or space below the kitchen floor. It is our objective that this plan of ventilation can be installed complete for from $50 to $60.

This kitchen ventilation system has had widespread acceptance to date. Many delegations have come to Rochester to look over the system, and so far every one of them has said that they did not realize the simplicity and the manner in which it accomplishes 100% customer satisfaction until they had visited the actual installations and talked with the customers themselves.

Reorganization Planned By Seattle Gas Co.

N. Henry Gellert, president of the Seattle Gas Co., has anounced that final steps have been taken to make that company completely independent of outside holding company influence. He disclosed that a recapitalization and reorganization plan has been filed with the Federal Securities and Exchange Commission, and at the same time announced that the company plans to spend approximately $700,000 by June, 1946, on plant improvements.

The announcements came only a few days after the board of directors voted payment of regular semi-annual dividends of $1.25 per share of first preferred stock, effective June 1. The payments will total approximately $58,000.

Hearing on the recapitalization and reorganization plan was held at Philadelphia on May 2, where SEC proceedings were already under way to restrain the Seattle company's parent organizations — Portland Electric Power Co., and Portland General Electric Co. —from disposing of their Seattle interests, pending the reorganization. The Portland concerns own 16.6% of the Seattle voting securities.

A New York engineering firm has been engaged to plan installation of $600,000 worth of capacity increasing oil-gas units at the Seattle company's plants, Gellert stated, and another $100,000 is to be spent on two standby units for production of propane air, which will give the company 2½ million cu. ft. of additional gas for use during winter load peaks.

In the Plan, provision is made to substitute for every present share of first preferred stock paying $5 a share, a new share of first preferred stock paying $2 a share, and in addition 1½ shares of a new or substituted common stock. To the second preferred stock there will be given one share of common stock for every ten shares of second preferred stock. Under the Plan the common stockholders will receive nothing, but the common stock represents an extremely small amount of the Company's capitalization. If the plan goes through as submitted, the present first preferred stockholders will own 47,105 shares of new preferred stock and 70,658 shares of new common stock, while the second preferred stockholders will own 2734 shares of common stock, making a total of 73,392 shares of common stock.

Objectives of A. G. A.'s Research Activity

By J. W. WEST, Jr.

Assistant Managing Director, American Gas Association*

SINCE the American Gas Association was organized in 1918, research in one field or another has been a basic Association activity. One of the eight objectives stated in its Constitution is "to advance knowledge and learning in the sciences, and to stimulate invention and research, especially as applied to the Gas Industry." Another objective is "to advance to the highest efficiency, the methods of manufacture, distribution and utilization employed in the Gas Industry."

The research conducted by the Association in the past has been broad in scope, although limited in size. Projects have been carried on in the fields of Gas Production, Transmission, Distribution and Utilization. Work was done in the field of Industrial and Commercial Gas Utilization for a number of years, before a Research Program of a fundamental nature to advance the performance level of domestic gas appliances was initiated in 1936.

Progress in Research

For the first seven years, this Domestic Gas Research Program was conducted on the modest scale of about $14,000 a year. But the results cannot be measured entirely in terms of the money spent. Effective methods of procedure were developed and many technical problems were explored and possible ways of solving them were uncovered.

At the end of that period in 1943 the sales, promotional and certain other normal activities of the Association had been substantially reduced by the impact of the war. This raised the question of whether membership dues should be reduced for the duration or an enlarged program should be inaugurated. The majority of the membership voted for more research with the result that Domestic Gas Research activities during the past two years have represented expenditures of about $90,000 a year, or a sixfold increase.

If any further proof is needed of the value which the gas industry attributes to cooperative research, the new Research and Promotional Development Plan provides it. That Plan proposed a total fund of $600,000 annually for gas production, general technical and utilization research, and the necessary funds were raised from gas companies in the course of 90 days—something of a record in such matters.

Broadly speaking, the basic research objectives of the Plan are to improve gas production, transmission, distribution and utilization by stimulating the development of improved and new processes and products. The aim is for the Association to do for the individual companies in the field of research whatever they need to have done but cannot do at all, or cannot do as well for themselves, in their separate and individual capacities.

The new Plan provides $150,000 annually for Domestic Gas Research, and work representing $98,000 has been authorized for the present Association year which began October 1, 1944.

There has been a lot of discussion about the respective obligations of gas utilities and manufacturers to conduct fundamental research on the one hand, and applied research on the other, for the improvement and development of gas appliances. Much thought, and an even greater amount of time, has been spent by utility men and manufacturers in discussing this question among themselves, and with each other.

I think about half of this time was wasted, because of the fact that although we were using the same words, we were not talking about the same thing. The simple word "research" covers a multitude of sins. It reaches from zero to infinity. I have heard, and read, many definitions of it. I am sure that one will be amusing. E. J. Boothby, recent chairman of the Domestic Gas Reseach Committee, says that "*Research* is what we do when we go to the library and find out what everybody else has already accomplished in the field that we are entering; *Research* is what we do when we get down to work and discover something new ourselves." Of course, both of these steps are necessary for any research work to be effective, and Mr. Boothby would be the first to say so.

Other organizations and people who have had much more experience in research than we have, are also troubled about this question of terminology. No less an authority than Charles F. Kettering of General Motors, recently stated that, "We are getting into the Tower of Babel as far as technical lingo is concerned and we need to get down into common words."

Research Classified

A recent advertisement of the Bell Telephone Company classifies research in four parts—it reads something like this:

> Fundamental Research uncovers the possibility and finds the idea.
> Applied Research and Development makes it work.
> Design gives it form.
> Specifications produce the product.

Frank Howard, until recently president of the Standard Oil Development Co., states that "new industries and the advancement of old industries depends first on increasing the sum of human knowledge. But they depend even more," he says, "on the new application of existing knowledge. The amount of scientific knowledge already available which ought to be applied to an industry, and has not yet been applied, is almost always far greater than the new contributions to human knowledge which any industrial research organization can hope to make. Quantitatively therefore," he says, "industrial research is largely development." In Mr. Howard's eyes the job of the manufacturers is much bigger than that of the gas companies.

Finally Lammont DuPont, chairman of the DuPont Co., gives what is perhaps a typical executive answer to this question by saying it is all a matter of dates. He said, "what is Fundamental Research today, is Applied Research tomorrow," and he expressed the conviction that it will always turn out that way. Mr. Kettering

*Presented before a luncheon session of Domestic Gas Conferences in Cleveland on May 9, 1945, and New York, May 24, 1945.

says the period between research and the resulting new product is not one day but 10 to 15 years. Thus the necessity for a continuing research program is evident.

In our own effort to determine the proper fields of research for gas utilities and for the manufacturers, we have recently given up any attempt to circumscribe definitely in advance the types of research that each should conduct. Instead we have put the whole thing on the basis of the particular project under consideration in the lap of the people considering its prosecution. We have provided that no project will be undertaken by the Association, representing the gas utilities, until it has been approved as essential by the Domestic Gas Research Committee which represents both Manufacturers and Gas Companies, and by the Executive Board of the A.G.A.

If applied research is proposed in any particular instance, it is most unlikely that it will receive the approval of the Committee and the Board if adequate efforts in that direction are under way by the manufacturers.

Utility Responsibility

Gas as a source of energy for heat and cold has its own inherent characteristics and it would certainly seem to be the responsibility of the gas utilities to explore the technical possibilities of utilizing their own product to the best advantage, and to establish the fundamental limits of these possibilities in their own self-interest and at their own expense. No single gas company represents as much as 10% of the industry. No domestic gas is sold for use as such. Yet, so far as I know, no gas utility manufactures a single domestic gas appliance. In other words, the growth in the sale of their product worth a billion dollars a year is completely dependent upon the availability of satisfactory appliances which are made by someone else.

When it comes to our manufacturers of gas appliances and equipment, the situation appears similar but in reality it is quite different. Here we also have a large number of manufacturers with perhaps only one doing as much as 10% of the whole business. I know of only one organization whose interests are inherently bound up with those of the gas industry, because they approach the point of making gas equipment for use in the fields of gas production, transmission and distribution as well as gas appliances. Many manufacturers also make appliances using fuels competitive with gas. The gas utility industry also has its combination gas and electric utilities. About 40% of the business is handled by such companies, but I do not know of any situation where any gas plant or system, or any large portion of it, can be converted to the production of the principal competitive fuel—electricity. On the other hand, for example, I am told that any gas range manufacturer could readily convert his plant to the production of electric ranges and utilize perhaps as much as 90% of the same facilities for that purpose.

In other words, the manufacturers' operations, with minor cost and difficulty can be readily shifted over to the production of competitive fuel appliances in case the public demand makes this seem advisable. This is not true of a single one of the 2000 gas companies operating in the United States and Canada. They must continue to use their plants and systems and personnel to make and sell gas or else be prepared to write off their investment. If the utilities leave the improvement and development of appliances in the lap of the manufacturer and he doesn't carry through, they have staked and lost their future growth.

Despite this fact, I think I can make the outright statement that nothing would please the gas companies better than for the manufacturers to undertake and to carry on an enlarged and adequate program of applied research and development for the improvement of domestic gas appliances such as is done by the electric manufacturers.

The Association has taken a number of steps recently to help bring this about. We have secured from 80% of the gas companies their recommendations for improvements in the postwar gas appliances. These recommendations have been weighted so as to reflect their potential sales value to the manufacturers and summarized for the United States as a whole by regions, and by types of gas used. All of this has been done to provide the manufacturers with a useable picture of the improvements in gas appliances that should prove most profitable to them in the future.

We have provided full manufacturer representation on the committees responsible for the selection of new research projects which are most essential and for the supervision and conduct of these projects whether they be fundamental or applied research. These manufacturer members are nominated by the Association of Gas Appliance and Equipment Manufacturers. Thus we have left no stone unturned to insure that the limited funds available for research will be spent on projects that will be helpful to every branch of the industry, and harmful to none.

We have revamped the contents of our research bulletins to make them more useable and valuable to the manufacturers as a foundation for their appliance development work. We have initiated a series of conferences, such as this one, for the purpose of having research personnel present the results of their work personally to the engineering and production experts of the manufacturers, so as to make this work more quickly and completely useable by you.

Continuous Program a Must

The need for a continuous program of better research is imperative in the gas industry. In the past our industry has grown in spite of inadequate reseach efforts, not because of them. Research will be the life blood of the gas industry in the future competitive era. It represents a tremendous opportunity for the industry as a whole, and for each of us personally.

In the past we have spent too much time arguing among ourselves about what each other should and should not do, and too little time on what we can and should do cooperatively to make the most of our joint resources for our mutual benefit.

The possibilities for profitable cooperation between the manufacturers and utilities in the field of research have just been touched. Individual company research is not enough. No single gas company and no single appliance manufacturer is yet big enough to dominate the research picture and assure the future of the gas industry. The industry as a whole has great resources in knowledge, talent, and money which have not yet been fully capitalized. Let us make the most of these resources through the concerted effort of an enlarged research program on which each of us can build our own future

DEHYRATION At High Pressure

Using Diethylene Glycol Water Solution

By N. K. SENATOROFF
Chemical Engineer
Southern Counties Gas Co., Los Angeles

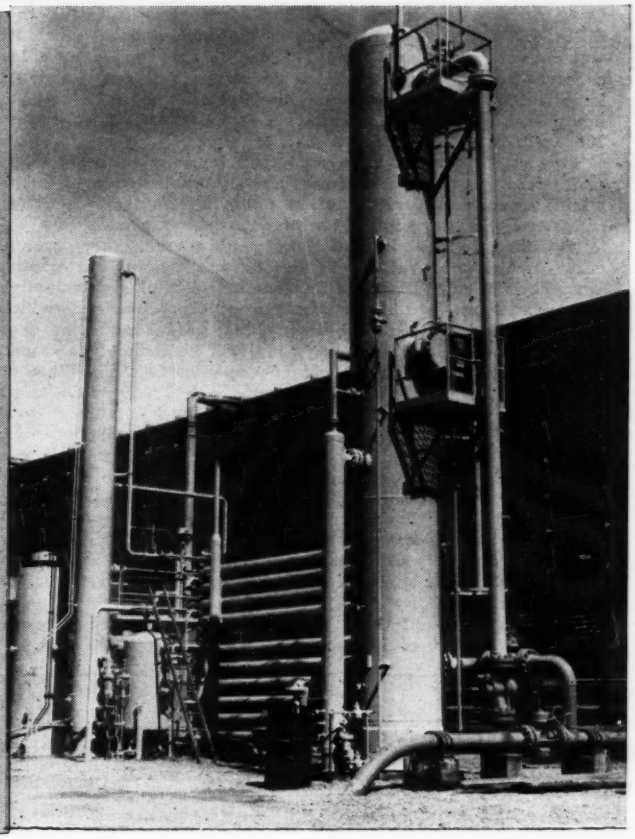


FIG. 1. (Right) View of 1000-lb. absorber at Southern Counties Gas Co. dehydration plant.

THE USE of liquid absorbents for dehydration of natural gases has been known to the gas industry for many years, and much engineering effort has been applied to perfecting the design of this type of dehydration plant. Numerous articles in technical literature have described in detail the successful application of liquid absorbents to the large volume and high operating pressure gas dehydration requirements of modern transmission line design. However, few engineering data have been published on the actual design of these plants, and there still appears to be ample room for improvement in the plants presently operated before they can be termed "perfect."

The first commercial dehydration plants using solutions of diethylene glycol were built in this country in the late thirties. Their original design was influenced, to a considerable extent, by the idea of possible reconversion to the calcium chloride absorbent in the event the glycol solution proved too expensive or otherwise unsatisfactory.

The DEG (Diethylene Glycol) absorbent has since proved to be a very satisfactory substitute for the calcium chloride solution, due primarily to the greater dew point depression obtainable with it, and to the absence of the danger of corrosive action by the absorbent under the most commonly encountered operating temperatures and/or pressures. During the last three or four years we have witnessed successful application of the DEG absorbent to the dehydration of natural gas at pressures in excess of 750 psig., and the application of the DEG solution to dehydration of natural gas at operating pressures in excess of 1000 psig. was first tried on the Pacific Coast this year in connection with operation of the recently completed Goleta-Ventura 16 in. Natural Gas Transmission Line. Fig. 1 shows a photograph of the 1000-lb. absorber at Southern Counties Gas Co.'s Ventura plant. Fig. 2 is a schematic drawing showing the details of the contactor tower of the water vapor absorption equipment.

This paper has been prepared with the idea of presenting some of the basic process engineer's computations pertaining to the design of water vapor absorption equipment, which might be of interest to those considering the use of the process, and to the men connected with the supervision and maintenance of these plants.

Water Vapor Absorption Equipment

Rigorous engineering design of absorption equipment in the present case was impossible because of the complete lack of data on the properties and behavior of DEG solution at 1000 psig. pressure, and the commonly accepted method of obtaining engineering and performance data by construction of a pilot plant was unthinkable because of time limitations imposed on the completion of the plant.

In view of these difficulties, it was finally decided to limit the design computations for the absorption equipment to purely theoretical studies of the effect of increased operating pressure on the important phases of the absorption process, taking, as a basis for the new equipment design computations, the original absorption equipment design of the old 400 psig. DEG dehydration plant. The justification for such an approach to the solution of the problem was found in the assumption that many features of the design defy exact computation anyway, and engineering practice has frequently produced successful design of equipment even though the theoretical calculations were far from complete.

In the selection of the absorption equipment, the bubble cap or the plate type tower absorber was preferred to the packed type tower for the same reasons which governed the selection of the 400 psig. absorber:

1. The bubble cap type tower gives more efficient gas-liquid contact than the packed type.

THIS STUDY presents an outline of the computations which it was necessary for the designing engineer to go through in order to be able to write up a set of specifications covering important structural details of the water vapor absorption equipment, fabricated to operate at pressures exceeding 1000 psig.

It was felt that methods employed in deriving basic data or in correlating the information already published elsewhere might prove very useful to the operating engineer directly connected with the supervision of dehydration plants.

Attached to the original paper are several very useful curves which are available in various publications, but which would be difficult to locate and work into a brief, conveniently assembled form. Two of these curves are reproduced herewith.

N. K. Senatoroff

N. K. SENATOROFF, following his graduation from the California Institute of Technology in 1928, immediately entered the utility industry with the old Los Angeles Gas and Electric Co. Upon the merger of that company with Southern California Gas Co., he became affiliated with Southern Counties Gas Co., and has since served that company in a number of technical capacities: Chemist (1937); research engineer (1940); chemical engineer (1941). On the subject of dehydration he has been the author of the following papers which have been published in the Proceedings of the Pacific Coast Gas Association: "Corrosion Study of Bolts in Dehydrating Tower Using Calcium Chlorine Brine," (1939); "Internal Corrosion of Gas Dehydrating Equipment by Calcium Chloride Brine," (1942); "Coiled-Pipe Dephlegmator for Rectifying Column in a Diethylene Glycol Natural Gas Dehydration Plant (1944).

Mr. Senatoroff's study is a companion piece to an article "Design of the Goleta Dehydration Plant" by Richard H. Hull, Pacific Lighting Corp., which was published in the May issue of GAS, p. 23. Both papers were presented before the Transmission Conference of the Pacific Coast Gas Association, Fresno, Calif., in March, 1945.

2. The bubble cap tower seldom presents difficulties from channeling of gas and liquid streams.
3. The bubble cap tower's total weight is considerably less than that of the packed tower. In regions subject to earthquakes, this factor acquires considerable importance.
4. The bubble cap tower, fitted with manways through the plates, can be cleaned and inspected at less cost than the packed tower.
5. Nearly all "modern" towers are of the bubble cap type.

Outline of Computations

The important design computations that were made by the engineers of the Southern Counties Gas Co., in order to provide structural detail specifications, and a set of complete drawings for the manufacturers of the pressure vessel equipment to bid on the fabrication of an absorber, bubble cap type, for the dehydration of natural gas under the operating conditions are shown in Table 1.

In a design project of this kind, many figures dealing with the physical properties of the materials involved in the process are used over and over again in the computations. Delay and confusion have been avoided by deriving and compiling these figures in a separate paragraph at the start of the work.

Since the laws of ideal gases and solutions are not applicable to the natural gas and DEG streams at higher pressures with an accuracy sufficient for engineering calculations, quantitative relationship among compositions, water vapor contents, velocities, densities, pressures, viscosities, weights and other often used properties of natural gas and of the liquid absorbent had to be computed for frequent reference.

Table 2 gives the physical characteristics of the gas at the Goleta-Ventura fields. The application of the pseudocritical method to calculations of the deviation factor for natural gas is best illustrated by the statement and solution of two problems as shown in Table 3.

Diameter of Absorber

The bubble cap tower is designed to give the most efficient countercurrent contact between the liquid absorbent and the gas, and to limit the amount of absorbent used, per unit of gas treated, to the lowest possible quantity adequate to dissolve the desired constitutent. In so doing, an intimate contact is necessary, but too high a gas velocity results in entrainment and consequent losses of an expensive DEG solution.

TABLE 1. OPERATING CONDITIONS FOR FABRICATION OF BUBBLE CAP TYPE ABSORBER.

Pressure-Pounds Gage	
Gas into absorber	1000
Gas out of absorber	998
Temperature-Degrees F	
Gas into absorber	70
Gas out of absorber	72
Dewpoint Temperatures-Degrees F	
Gas into absorber	70
Gas out of absorber	30
General Data	
Gas volume treated	50 MMcf. per day
Specific gravity of DEG-water solution: into absorber, 1.117 (95% by wt. DEG 5% by wt. water); out of absorber, 1.115 (90% by wt. DEG—10% by wt. water) (See Fig. 3.)	
Temperature of DEG-water solution—Degrees F: into absorber	70
out of absorber	72
Circulation rate of DEG-water solution: 5-10 gal. per minute, or 300-600 gal. per hour, or 144-288 gal. per 1 M²cf. of gas treated	

Entrainment is governed by several factors, some of which are: superficial velocity of the gas stream, density of the gas, density of the liquid absorbent and the structural design of the bubble cap plates. These factors are related to one another as shown in the following equation:

$$W = C\sqrt{d_2\,(d_1 - d_2)}$$

(See "Fractionating Columns," Ref. Nat. Gas Mfg., Jan. 1934)

Where

W = mass velocity, lbs. per sq. ft. per hr.
d_1 = density of liquid, lbs per cu. ft. (at tower temp.)
d_2 = density of natural gas stream, lbs. per cu. ft. (at tower cond.)
C = a constant

The value of the constant C is dependent on the tray spacing, the properties of the liquid, and the construction of the bubble cap plate.

In order to use the foregoing equation, it is necessary to determine the value of C experimentally, or from a curve, Fig. 4 (Dr. G. G. Brown & Ind. Eng. Chem.), or from the operating data of identically designed equipment. We estimated the value of C from performance of the 400 psig. bubble cap absorption tower as shown in Table 4.

The actually designed absorber diameter was increased to 50 in. I.D. in order to take care of unforseen contingencies that might occur in the operation of the dehydration plant.

Effect of Total Pressure Upon Absorption Rate

In the quantitative study of the variation in rates of absorption, due to increase or decrease of the total pressure in the absorption equipment, it is customary to use the Stefan equation (IX)* (Sherwood):

$$N_a = \frac{DP}{RTx} \ln \frac{Pb_2}{Pb_1}$$

Where

N_a = rate of diffusion for gas "a" (mols./(unit area) (unit time))
D = diffusion coefficient or diffusivity, cm²/sec.
P = total pressure, atms.
R = gas law constant
T = absolute temperature, °R or °K
x = effective total film thickness
Pb_2 = partial pressure of the inert or non-diffusing gas at outlet, atms.
Pb_1 = partial pressure of the inert or non-diffusing gas at inlet, atms.

The problem of checking the theoretical effect of total pressure on the rate of water vapor absorption by the glycol solution could be stated as follows: By what percentage would the rate of absorption vary while increasing the total operating pressure on the plate tower from 400 psig. to 1000 psig.? The Stefan equation is shown in Table 5, (Page 34).

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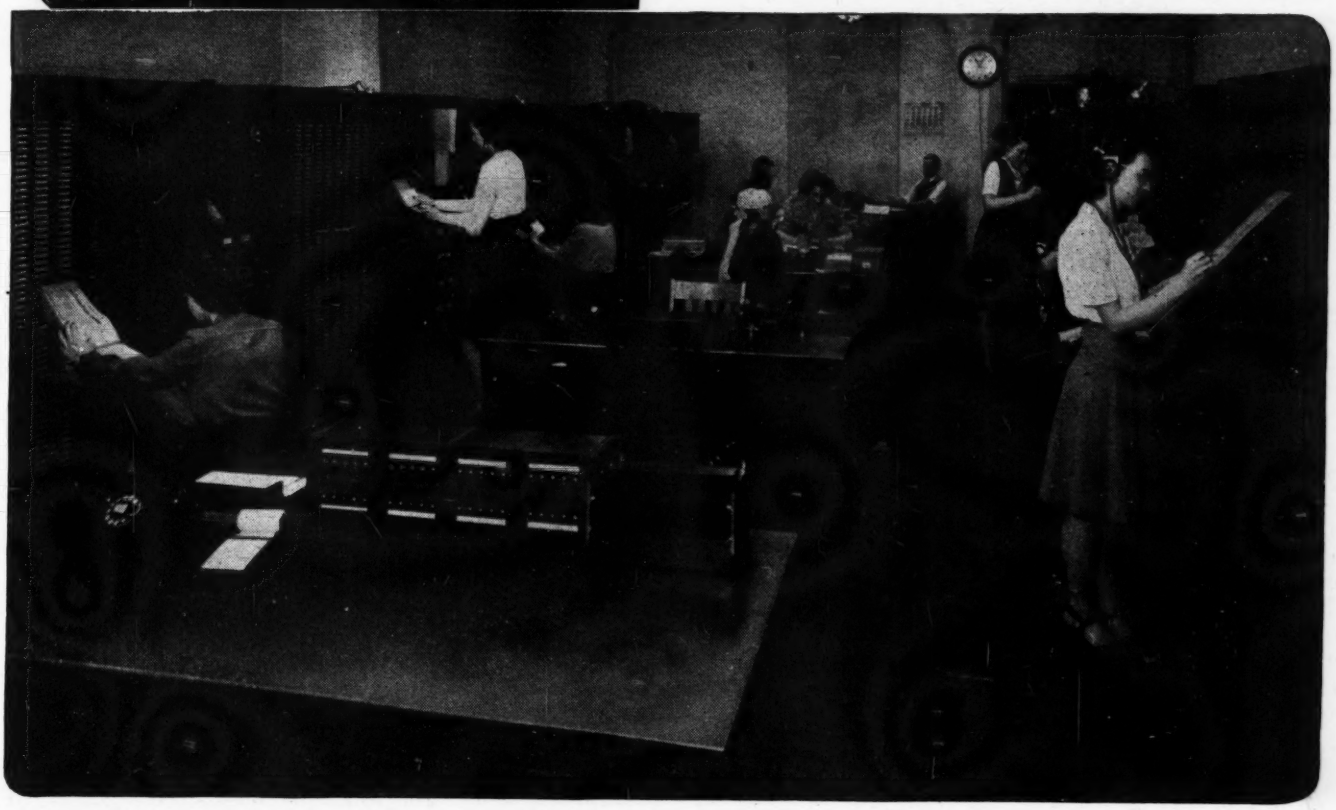

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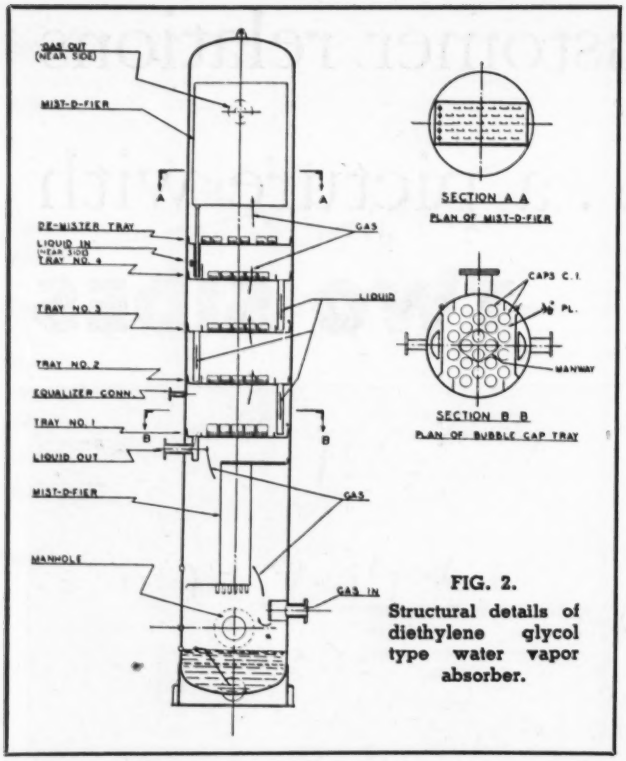


FIG. 2.
Structural details of diethylene glycol type water vapor absorber.

The diffusion rate through the controlling gas films at 1000 lbs. is 51.9% of the rate of 400 lbs.

However, taking into consideration the actual quantities of water to be removed from the gas, at 400 psig. and 1000 psig. pressures, one finds that the decrease in diffusion rate is very closely compensated by the lowered weight of the water extracted. The two ratios are found to be as follows:

When operating @ 400 psig. (46.0 — 13.4) = 32.6 lbs. of water are removed per 1 M²cf. of dehydrated gas.

When operating @ 1000 psig. (24.5 — 7.6) = 16.9 lbs. of water are removed per 1 M²cf. of dehydrated gas.

And the ratio of the two weights is equal to

$$\frac{16.9 \text{ lbs.}}{32.6 \text{ lbs.}} = .518 \text{ or } 51.8\%.$$

Thus, the decreased rate of diffusion of 51.9% is compensated by the 51.8% drop in the water vapor load, and the performances of absorption equipment at 400 psig. and 1000 psig. should be very nearly identical.

Theoretically, therefore, the increased operating pressure on absorption equipment should not call for any change in the structural design of the absorption equipment details.

Plate Spacing

One serious cause of inefficiency in the bubble cap plate absorber is the entrainment and carry-over of the contacting liquid from the lower plate to the one above. It occurs either as a result of excessive gas velocity through the bubble cap slots, which creates splashing or spouting of the liquid, or due to inadequate plate spacing, which does not allow time for small particles of liquid, suspended in the gas stream, to fall back and settle on the parent plate.

Thus the design of absorption equipment is restricted by two conflicting performance requirements: on the one hand, gas and vapor velocities should be high enough to provide an intimate contact between the liquid and the gaseous phases: and on the other, the contact velocities must not be too high to cause undue entrainment.

Chillas and Weir (XI) report that entrainment is negligible at a velocity of 2 ft. per second, but that it amounts to 20.5% at 5.5 ft. per second. In typical industrial absorbers, having trays spaced at 22 in., the entrainment is approximately as shown in Table 6.

Souders and Brown (X) have derived the theoretical suspending velocity and have shown the effect of tray spacing on entrainment. Normally the distance between the plates should never be less than 6 in. above the liquid level for ordinary vapor velocities.

Kallam (IV) finds that the capacity of an absorber was more than doubled by increasing the tray spacing from 7 to 14 in. and that, at the same time, half as many trays gave almost as good an absorption.

The trays in petroleum oil absorbers are usually spaced at 18 to 24 in., and in some service the distance is as high as 36 in.

In our case, we have retained the 36-in. spacing of the 400 psig. absorber in the 1000 psig. vessel, because it provides ample room for the installation of manways through the trays, renders internal inspection of the vessel less difficult, and assures minimum entrainment loss and high plate efficiency.

Determination of the Number of Plates in Absorber

The theoretical calculation of the number of plates needed to achieve a given absorption of one of the components from a complex hydrocarbon mixture usually requires considerable amount of either numerical or graphical computations, because of the fact that each component must be treated separately.

The computation technique for natural gas dehydration, however, is greatly simplified because the process of water vapor absorption involves the removal of only one component from the gaseous phase, namely, water vapor.

Using the method of computation covered by Laulhere and Briscoe (VI) the following number of theoretical plates were found to be needed for the 1000 psig. absorber.

TABLE 2. PHYSICAL CHARACTERISTICS OF GAS— GOLETA-VENTURA FIELDS.

Gas Analyses

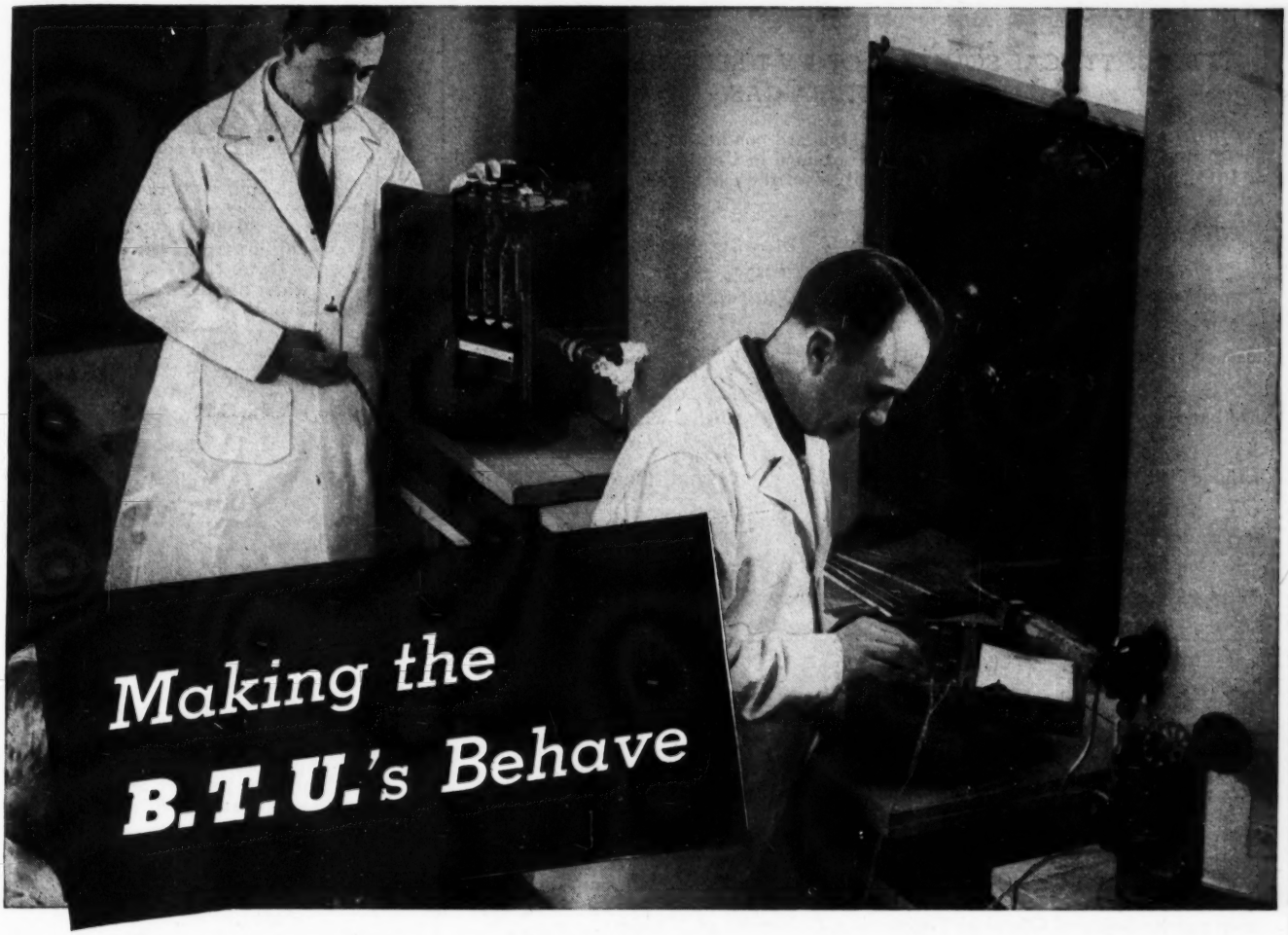
(Combustion Method)—Typical range of composition—per cent by volume:

Carbon Dioxide	CO_2	0.1	0.4
Methane	CH_4	76.0	84.5
Ethane	C_2H_6	22.9	13.0
Oxygen	O_2	none	0.5
Nitrogen	N_2	1.0	1.6

	Mol. Fraction	Mol. Wt.	Mol. Fraction	Mol. Wt.
CO_2	0.001×44.01	= 0.044	0.004×44.01	= 0.176
CH_4	0.760×16.04	= 12.190	0.845×16.04	= 13.554
C_2H_6	0.229×30.07	= 6.886	0.130×20.07	= 3.909
O_2	0.000×32.00	= 0.000	0.005×32.00	= 0.160
N_2	0.010×28.02	= 0.280	0.016×28.02	= 0.448
	1.000	= 19.400	1.000	= 18.247

The average mol. wt. of the gas mixture $= \frac{19.400+18.247}{2} = 18.824$

The average specific gravity (air = 1.0) $\frac{18.824}{28.966} = 0.650$



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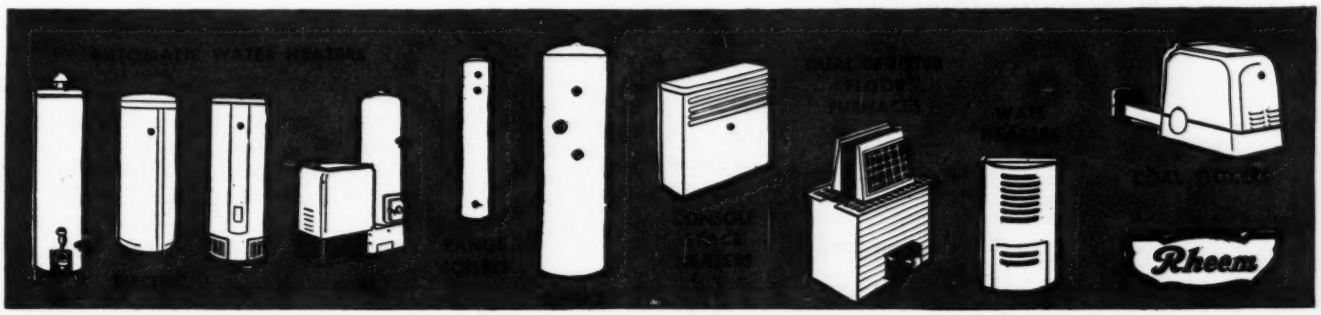

TABLE 3. TYPICAL SOLUTION OF P-V-T RELATIONSHIPS OF GOLETA-VENTURA GAS.

PROBLEM 1. Calculate the volume at standard conditions (14.73 psi. abs. and 60°F.) that would be occupied by the gas contained in 1 cu. ft. of space at pressure of 1014.73 psi. abs. and 70°F. (average analysis of the gas is given in the following tabulation):

SOLUTION:

Component (Average)	A Mol. Fraction	B Critical T °FAbs.	C Crit. P lb./sq. in. Abs.	D A×B	E A×C
Carbon Dioxide	$\frac{0.001+0.004}{2}=0.002$	549	1072	1.098	2.144
Methane	$\frac{0.760+0.845}{2}=0.803$	344	673	276.232	540.419
Ethane	$\frac{0.229+0.130}{2}=0.180$	550	712	99.000	128.160
Oxygen	$\frac{0.000+0.005}{2}=0.002$	278	730	0.556	1.460
Nitrogen	$\frac{0.010+0.016}{2}=0.013$	227	492	2.951	6.396
	=1.000			379.837	678.579

Tc—Pseudocritical temperature = 379.84°F. abs.

Pc—Pseudocritical pressure = 678.58 psi. abs.

Tr—Reduced temperature $= \frac{(460°+70°)}{379.84} = \frac{530°\text{F. abs.}}{379.84} = 1.395$

Pr—Reduced pressure $= \frac{1014.73 \text{ psi. abs.}}{678.58} = 1.495$

The compressibility factor Z was obtained from published work on "Deviations of Natural Gas from Ideal Gas Laws," by George Granger Brown, Consulting Engineer and Professor of Chemical Engineering, University of Michigan.

$$Z = 0.825 \qquad \left(Y = \frac{1}{Z} = 1.2125\right)$$

Therefore, the given gas at standard conditions would occupy a volume of:

$$V_0 = \frac{1014.73 \text{ psi. abs.} \times 1 \times (460°\text{F.}+60°\text{F.})}{(460°\text{F.}+70°\text{F.}) \times (14.73 \text{ psi. abs.})} \times \frac{1}{0.825} = 81.93 \text{ cu. ft.}$$

Not considering "deviation," the result would have been:

$$V_1 = \frac{1014.73 \text{ psi. abs.} \times 1 \times (460 \text{ F.}+60°\text{F.})}{(460 \text{ F.}+70 \text{ F.}) \times (14.73 \text{ psi. abs.})} = 67.59 \text{ cu. ft.}$$

Not considering the deviation, the error in computing volume flow through the absorber would have been 17.5% low.

PROBLEM 2. Calculate the volume at standard conditions (14.73 psi. abs. and 60°F.) that would be occupied by the gas contained in 1 cu. ft. of apsce at pressure of 414.73 psi. abs. and 70°F. (average analysis of the natural gas mixture being the same).

SOLUTION; For the purpose of comparison of the two methods of computation we are using R. V.Dunkle's article on "Deviation of Natural Gas from Boyle's, Law," *GAS*, Oct., 1944, p. 41 and *PCGA Proceedings*, 1944, to arrive at the following pseudocritical temperatures and pressures:

Basis of calculations:

Specific gravity (S), Carbon Dioxide Fraction (C), and the heating value of the gas mixture (H).

Average mol. weight of the gas = 18.824 lbs. (see above)

Average specific gravity (air = 1.0) = 0.650

Average heating value (Btu./cu. ft.—dry) =

Methane value $\frac{(0.760+0.845)\times 1015}{2} = 815.05$

Ethane value $\frac{(0.227+0.130)\times 1795}{2} = 321.30$

1136.35

(Continued on Page 00)

Using the equation:

$$A = \frac{0.00175Gd}{K}\left(S_w + \frac{18S_s}{M_1}\right)$$

Where

A = absorption factor

G = gallons of DEG solution per 1 Mcf. of gas $= \frac{10 \text{ gal./min.} \times 60 \times 24}{50{,}000} = 0.288$ gals.

d = specific gravity of the DEG solution (1.117 & 1.115)

S_w = % water by weight of DEG solution (5 & 10%)

S_s = % DEG by weight of DEG solution (95 & 90%)

M_1 = molecular weight of DEG (106.08)

$K = \frac{y}{x} = k\,P_n/C\,P$

wherein

$$k = \frac{ab}{Y},$$

b = the ratio of the water vapor content of gas under operating pressure to that at atmospheric pressure for the same temperature.

a = the ratio of water vapor pressure at absorber conditions to that at atmospheric pressure and the same temperature.

Y = superexpansibility factor (1.2125)

k = 1.358 (VI)

P_n = vapor pressure of water at atmospheric pressure and operating temperature (70°F.) = 0.364 lbs. per sq. in.

C = hygroscopic absorbent factor for DEG = 1.2 (VI)

P = total operating pressure in psi. abs. = 1014.73 psi. abs.

K is evaluated as shown in Table 7.

From the curves of "Absorption Efficiency vs. Absorption Factor and Number of Theoretical Plates," (VI) we find that one theoretical plate will give 97% absorption efficiency, thus requiring at least two theoretically perfect plates per absorber. In general, the plate performance efficiency of an actual plate differs considerably from that of an ideal plate. The actual plate efficiency reportedly ranges from 70 to 90% for petroleum oil columns. Designers of natural gasoline absorbers use a 55 to 65% efficiency figure for low pressure columns and only 45 to 55% for absorbers operating at 400 to 600 psig. pressures.

From these calculations and our own experience with the operation of the 400 psig. absorber, the new 1000 psig. plate tower was designed with four bubble cap plates.

Miscellaneous Detail Design Specifications

The Overflow Pipe capacity is a very important factor in the efficient performance of the bubble cap plate. The capacity of these pipes is limited by the amount of liquid which can enter them, since this flows in under low head. Moreover, the unknown "frothing" coefficient of the DEG-

water-natural gasoline solution may affect their capacity to a considerable extent. For these reasons, consideration was given to the careful computation of the required size of overflow pipes.

The designed maximum rate of DEG circulation is equal to 10 gals. per min. With an assumed frothing coefficient of 2:1, the size of the overflow pipe was computed on the basis of 20 gals. per min. volume of "frothed" solution circulation.

The "usually" recommended liquid velocity in these pipes does not exceed four linear inches per second. However, since in many vessel designs a velocity of 2 in. per second will not incur a large expense, the use of the low velocity figure was adopted in our absorber. The required number of 3 in. I.D. and 4 in. I.D. pipe size spouts for the absorber is determined as shown in Table 8.

The final selection of the shape and the size of overflow pipes was based on the recommendations of engineers representing the pressure vessel manufacturing firm. In adapting their type of bubble caps, risers, and the general plate layout, it was felt that the overflow pipes should be looked upon as an integral part of the bubble cap plate assembly, and consequently the recommended shape would fit in better into their standard type of plate absorber. In the final selection of design, the fabricator of the absorber was requested to provide only the necessary cross-sectional area in the overflow pipe, with no limitation as to the shape of the opening.

Bubble Caps

The exact design of the bubble cap appears to be of little importance except from the standpoint of convenience in assembling or replacing and also from the cost standpoint. Kallam (III) reports that the shape of the slots appears to have no effect on absorption efficiency. The same shape of bubble is produced with any shape of the slot. At low velocity flat disk-shaped bubbles are produced; at high gas vapor velocity a channeling occurs and a continuous elongated bubble extends through the liquid. Contrary to common belief, it appears that more effective contacting occurs at low, rather than at high velocities.

The typical dimensional relation between the O.D. of the round caps (in inches), the riser area (in sq. ft.), and the slot area per cap (in sq. ft.) is given in the following table:

Cap O.D. (in.)	3-6
Riser Area per Cap (sq. ft.)	0.0204-0.0232
Slot Area per Cap (sq. ft.)	0.0165-0.0469

TABLE 3. TYPICAL SOLUTION OF P-V-T RELATIONSHIPS OF GOLETA-VENTURA GAS

(Continued from Page 00)

Average Carbon Dioxide mol. fraction = 0.0025

Tc—Pseudocritical temperature = 128.5 + 90.1(S) + 0.1632 (H) + 244(C) = 373.2°F. abs.

Pc—Pseudocritical pressure = 670.7 — 183.9(S) + 0.1028(H) + 683(C) = 669.7 psi. abs.

$$\text{Tr—Reduced temperature} = \frac{70°\text{F.} + 460°\text{F.}}{373.2°\text{F.}} = 1.420$$

$$\text{Pr—Reduced pressure} = \frac{400 \text{ psig.}}{669.7 \text{ psi. abs.}} = 0.597$$

$$Y_{400} = \frac{1}{Z} = 1.072$$

Therefore, the given gas at standard conditions would occupy a volume of

$$V_0 = \frac{414.73 \text{ psi. abs.} \times 1 \times (460°\text{F.} + 60\text{F°.})}{(460°\text{F.} + 70°\text{F.}) \times (14.73 \text{ psi. abs.})} \times 1.072 = 29.61 \text{ cu. ft.}$$

$$V_1 = \frac{414.73 \text{ psi. abs.} \times 1 \times (460°\text{F.} + 60\text{F°.})}{(460°\text{F.} + 70°\text{F.}) \times (14.73 \text{ psi. abs.})} = 27.62 \text{ cu. ft.}$$

The volumetric error in the case of the 400 psig. pressure would amount to 7.05%.

Density of gas/1 cu. ft. @ standard conditions = 0.0765 × 0.650 × 1.00 = 0.0497 lbs.

Density of the gas/1 cu. ft. of space @ 400 psig. = 0.0765 × 0.650 × 29.61 cu. ft. = 1.472 lbs.

Density of the gas/1 cu. ft. of space @ 1000 psig. = 0.0765 × 0.650 × 81.93 cu. ft. = 4.072 lbs.

TABLE 4. DETERMINATION OF THE SIZE OF THE ABSORBER.

Capacity of the 400 psig. absorber (max.) had been established to be equal to 30 M²cf./day.

Cross Sectional Area of 48 in. O.D. absorber in sq. ft. =

$$\frac{\pi \times (\text{ID}'')^2}{4} = 0.785 \times \left[\frac{48'' - 2''}{12''}\right]^2 = 11.534 \text{ sq. ft.}$$

Specific Gravity of the gas = 0.650 (air = 1.0)

d_1 = *density of DEG (90%)* = Sp. gravity solution × density of water = 1.115 × 62.2614 = 69.422 lbs./cu. ft.

d_2 = *density of gas* = 1.472 lbs./cu. ft.

$$\text{Mass velocity, } W = \frac{30{,}000{,}000 \text{ cu. ft.} \times 0.0765 \times 0.650}{11.534 \text{ sq. ft.} \times 24 \text{ hrs.}} = 5386$$

$$\text{Therefore, } C = \frac{W}{\sqrt{d_2(d_1 - d_2)}} = \frac{5386}{\sqrt{1.472\ (69.422 - 1.472)}} = \frac{5386}{\sqrt{100.0224}} = 538.5$$

After having determined the value of C, the diameter of the 1000 psig. absorber is calculated as follows:

$$W_{1000} = C \times \sqrt{d_2(d_1 - d_2)}$$

Where

d_1 = density of DEG (90%), same as above = 69.422 lbs./cu. ft.

d_2 = density of gas = 4.072 lbs./cu. ft.

$$W_{1000} = 538.5\sqrt{4.072\ (69.422 - 4.072)}$$
$$= 538.5\sqrt{4.072 \times 65.350}$$
$$= 538.5\sqrt{266.105}$$
$$= 538.5 \times 16.313 = 8784.55$$

The designed capacity of the absorber to handle 50 M²cf./day, in terms of the weight load in lbs., is equal to:

$$\frac{50{,}000{,}000 \text{ cu. ft.} \times 0.0765 \times 0.650}{24 \text{ hrs.}} = 50{,}000 \times 2.071 = 103{,}550 \text{ lbs.}$$

Thus, the cross-sectional area of the absorber is determined to be

$$\frac{103{,}550 \text{ lbs.}}{8784.55} = 11.788 \text{ sq. ft. and } (\text{Diameter})^2 = \frac{\text{Area}}{\frac{\pi}{4}} = \frac{11.788}{0.785} = 15.016 \text{ sq. ft.}$$

$$\text{Diameter} = \sqrt{15.016} = 3.875 \text{ ft.}$$
$$3.875 \times 12'' = 46.5''\text{I.D.}$$

TABLE 5. EFFECT OF TOTAL PRESSURE UPON ABSORPTION RATE

Using the Stefan Equation

$$\frac{N_{a\ 1000}}{N_{a\ 400}} = \frac{\left[\frac{DP}{RTx}\left(\ln\frac{Pb_2}{Pb_1}\right)\right]_{1000}}{\left[\frac{DP}{RTx}\left(\ln\frac{Pb_2}{Pb_1}\right)\right]_{400}} = \frac{\left[\ln\frac{Pb_2}{Pb_1}\right]_{1000}}{\left[\ln\frac{Pb_2}{Pb_1}\right]_{400}}$$

because it has been shown (IX) that $\frac{DP}{RTx}$ is independent of pressure in absorption processes in which the liquid film resistance becomes negligible and only the gas film resistance plays a controlling part in the rate of diffusion. This simplification of the general equation is permissible because of the high solubility of the water vapor (solute) in the glycol absorbent (solvent) of any concentration.

Using experimental data of the University of Oklahoma Research Institute, "Saturated Water Vapor Content of Natural Gas," the following partial pressures of water vapor and natural gas were computed:

Water vapor content—lbs./M²cf. @ 70°F. dew pt. & 400 psig. = 46.0

Water vapor content—lbs./M²cf. @ 30°F. dew pt. & 400 psig. = 13.4

Water vapor content—lbs./M²cf. @ 70°F. dew pt. & 1000 psig. = 24.5

Water vapor content—lbs./M²cf. @ 30°F. dew pt. & 1000 psig. = 7.6

To calculate Pb_1 and Pb_2 (partial pressures of the natural gas at inlet and outlet of the contractor) we shall calculate their values as shown:

Partial pressure = mol. fraction × total pressure

Mol. fraction gas = 100 minus mol. fraction H_2O

a. For 400# and 70°F. D.P.

$$\frac{46.0\#}{18.016\#} = 2.5533 \text{ mols. of } H_2O \text{ per } M^2cf.$$

$$1\ M^2cf. = \frac{1{,}000{,}000 \times 0.0765 \times 0.650}{18.824} = 2641.575 \text{ mols. of nat. gas}$$

$$\frac{2.5533}{2641.575} \times 100 = .0967\%\ H_2O$$

$$Pb_1 = (1 - .000967) \times \frac{414.73}{14.73} = .999033 \times 28.1554$$

$$= 28.1282 \text{ partial pressure of inlet gas in atmospheres}$$

b. For 400# and 30°F. D.P.

$$\frac{13.4\#}{18.016\#} = 0.7438 \text{ mols. } H_2O \text{ per } M^2cf.$$

$$\frac{0.7438}{2641.575} \times 100 = .0282\%\ H_2O$$

$$Pb_2 = (1 - .000282) \times \frac{414.73}{14.73} = .999718 \times 28.1554$$

$$= 28.1475 \text{ partial pressure of outlet gas in atmospheres}$$

c. For 1000# and 70°F. D.P.

$$\frac{24.5\#}{18.016\#} = 1.3599 \text{ mols. of } H_2O \text{ per } M^2cf.$$

$$\frac{1.3599}{2641.575} \times 100 = .0515\%\ H_2O$$

$$Pb_1 = (1 - .000515) \times \frac{1014.73}{14.73} = .999485 \times 68.8886$$

$$= 68.8531 \text{ partial pressure of inlet gas in atmospheres}$$

d. For 1000# and 30°F. D.P.

$$\frac{7.6\#}{18.016\#} = .4218 \text{ mols. of } H_2O \text{ per } M^2cf.$$

$$\frac{.4218}{2641.575} \times 100 = .0160\%\ H_2O$$

$$Pb_2 = (1 - .000160) \times \frac{1014.73}{14.73} = .999840 \times 68.8886$$

$$= 68.8776 \text{ partial pressure of outlet gas in atmospheres}$$

Then

$$\frac{N_a(1000)}{N_a(400)} = \frac{\ln\frac{68.8776}{68.8531}}{\ln\frac{28.1475}{28.1282}} = \frac{\ln 1.0003558}{\ln 1.0006861} = \frac{15.4517 \times 10^{-5}}{29.7867 \times 10^{-5}} = .519 = 51.9\%$$

The Overflow Dam

The overflow weir or dam is usually designed so that it maintains 0.5 to 1.5 in. of liquid depth above the top of the bubble cap slots. In general, the plate efficiency is higher with a deep liquid seal. The depth of the seal, however, should be determined by the flow condition. The importance of this fact has been overlooked occasionally in the past and has resulted in the serious loss of DEG solution into the sump, because of inadequate free board distance between the surface of the flowing DEG and the top of the bubble cap riser.

The effective head H above the weir is determined by the formula:

$$Q = 3.33\ (L - 0.2\ H) \times H^{3/2}\ \text{C.F.S. (XII)}$$

$$Q = 10 \text{ gal./min.} = \frac{10 \text{ gal.}}{\text{Min.} \times 7.48 \text{ gal./cu. ft.}} = \frac{1.34 \text{ cu. ft.}}{\text{Min.}}$$

$$= 0.02233 \text{ cu. ft./sec.}$$

L = Perimeter of the weir = 2.5 ft.

Assuming an arbitrary value for H of ¼ in. (0.0208 ft.) and solving the equation by the trial and error method, it was found that the effective head H of the liquid above the weir is 0.226 in. Thus, the bubble cap riser should be higher than the height of the downstream weir of the plate by at least ¼ in., in order to provide the minimum free board distance.

Mist-D-Fiers

The importance of the complete removal of entrained liquid from the gas stream entering the bubble cap absorbers can never be overstressed if one wishes to build as fool-proof a dehydration plant as possible.

To protect the plant against handling excessive amounts of entrained water, well condensate and slugs of absorption oil, some type of scrubbing device should be installed at the base of the absorber.

Highly efficient scrubbing means must also be provided at the outlet of the absorber to thoroughly remove even traces of the DEG solution, because this solution not only is expensive but is just as undesirable in the transmission line as any other type of condensate.

There are several well known manufacturing firms who have specialized in fabrication of scrubbing devices under such names as "Tracyfier," "Mist-D-Fier," etc., and who are guaranteeing their equipment to limit mechanical entrainment loss from the absorbers to less than 0.075 gal. of DEG per 1 M²cf.

Our experience with the full load operation of "Mist-D-Fier" elements designed for a rate of 30 M²cf. per

TABLE 6. ENTRAINMENT IN INDUSTRIAL ABSORBERS.

Material	Pressure	Linear Velocity Ft. per Sec.	Percent Entrainment
Gasoline	Atmos.	1.4	0.25
Gasoline	Atmos.	3.0	0.80
Gas Oil	20 mm	10.0	1.80
Air Water	Atmos.	0.3	0.04
Air Water	Atmos.	2.2	0.70

day at 400 psig. shows entrainment losses of less than .05 gal. per 1 M²cf. On a basis of this experience, "Mist-D-Fier" nests were selected and installed in the 1000 psig. absorber.

Summary

In this paper, the writer has presented an outline of the computations which it was necessary for the designing engineer to go through in order to be able to write up a set of specifications covering important structural details of the water vapor absorption equipment, fabricated to operate at pressures exceeding 1000 psig.

It was felt that methods employed in deriving basic data or in correlating the information already published elsewhere might prove very useful to the operating engineer directly connected with the supervision of dehydration plants.

Attached to the paper are several very useful curves which are available in various publications, but which would be difficult to locate and work into a brief, conveniently assembled form.

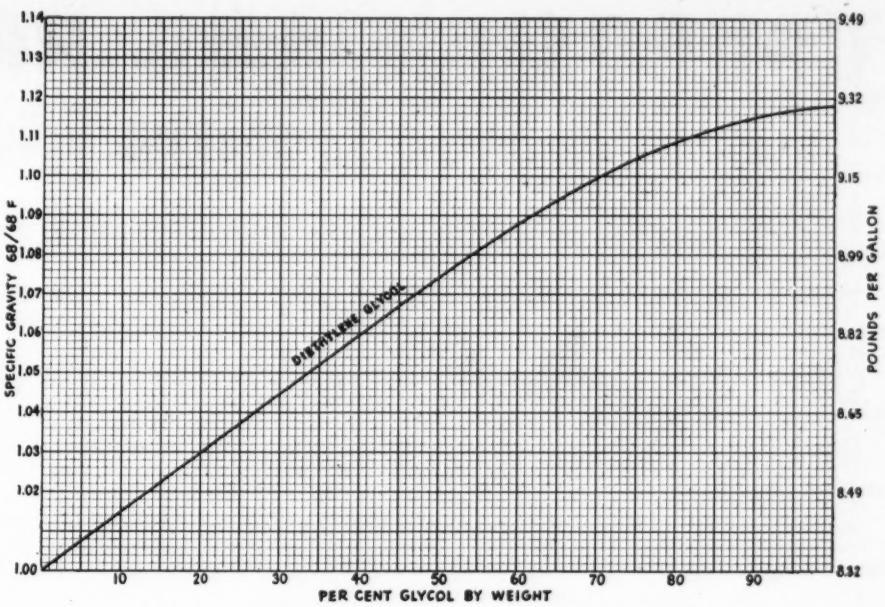

FIG. 3. Specific gravity of diethylene glycol water solution.

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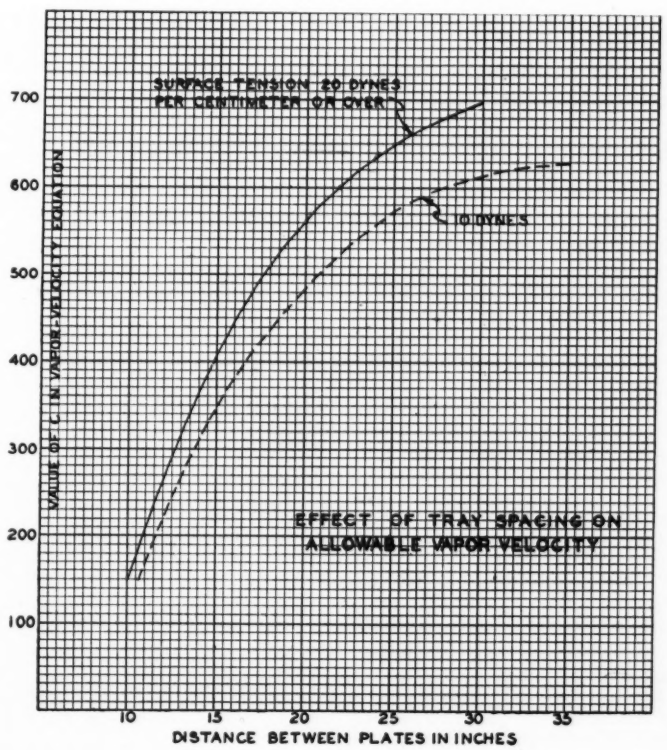


FIG. 4. Effect of tray spacing on allowable vapor velocity.

TABLE 7. EVALUATION OF K IN EQUATION

$$K = \frac{y}{x} = k\,Pn / c\,p$$

$$K = \frac{1.358 \times 0.364 \text{ psi.}}{1.2 \times 1014.73 \text{ psi.}} = \frac{0.494312}{1217.676} = 0.0004059$$

$$A = \frac{0.00175 \times 0.288 \times 1.116 \text{ (ave. value)}}{0.0004059}\left[\left(\frac{5+10}{2}\right) + \left(\frac{18 \times \frac{90+95}{2}}{106.08}\right)\right]$$

$$= \frac{0.00056246}{0.0004059} \times 23.195 = 1.3857 \times 23.195 = 32.1413$$

TABLE 8. DETERMINATION OF ABSORBER PIPE SIZE SPOUTS

$$N_3'' = \frac{20 \text{ gal./min.} \times 231 \text{ cu. in.}}{60 \text{ sec./min.} \times 2 \text{ in./sec.} \times 7.393 \text{ sq. in.}} = 5.2$$

$$N_4'' = \frac{20 \text{ gal./min.} \times 231 \text{ cu. in.}}{60 \text{ sec./min.} \times 2 \text{ in./sec.} \times 12.73 \text{ sq. in.}} = 3.0$$

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

Use of Carbon Anodes in Cathodic Protection

M. J. DORCAS, technical advisor, National Carbon Co., Inc., Cleveland, Ohio. From a paper, "Ground Anodes," first presented before the fifth National Bureau of Standards Soil Corrosion Conference, St. Louis.

IN the majority of cathodic protection systems iron, usually in the form of scrap pipe has been used as the ground material. This selection has been made partly because scrap pipe frequently has been available, partly because precedent or custom has established its use, and at least at one time because other materials were not known to be available.

These anodes represent a substantial replacement item in the maintenance of a cathodic protection system and are important factors in the requirements of time and money required for preserving the system in such condition as to provide reliable and adequate protection against corrosion. In addition to scrap steel various other materials have been and are used as anodes. These include cast iron, special ferrous alloys, copper, zinc, magnesium and carbon in the form of amorphous carbon or as graphite. Each have their special fields of application. Carbon and graphite seem to have special advantages in many situations.

Use by Electrochemical Industry

The Electrochemical industry which uses many thousands of electrolytic cells in the industrial manufacture of chlorine, caustic soda, chlorates, hypochlorites, metallic sodium, magnesium, aluminum and many other substances considers carbon and graphite anodes as indispensable requirements for economical and reliable operation of electrolytic cells. Since slightly before the year 1900 when the graphite electrodes were made available to the industry by Dr. E. C. Acheson, this type of electrode has been used almost exclusively in electrolytic cells involving water solutions because of the rare combination of physical and chemical properties possessed by this material. They have high electrical conductivity and great resistance to oxidation and corrosion resulting in long life and low cost operation.

Anodes Applied as Rods

These carbon or graphite anodes are usually applied as rods. Principal sizes in common use are 80 in. long and 2, 4, or 6 in. in diameter. Such rods weigh about 20, 65, and 140 lbs. respectively. A short length of copper cable is attached to each rod to facilitate making the electrical connections. There is some variation in practice concerning the nature of these copper connections. Various engineers have distinct preferences for different types and brands of commercial cable and insulation. Within reasonable limits, any preferred type of cable can be used if specified. In general, a number 6 cable is used to keep down voltage requirements.

The type of insulation on the copper conductor may be important for particular soil solution conditions or it may not be important depending on individual experience of the engineers involved. The type and details of the connection of the conductor to the carbon rod is almost always important. Considerable variation in practice is encountered. Some rods are installed in the field with very simple field made connections and sometimes these have proved to be satisfactory. Experience in general has indicated that best results and lowest long-time overall costs were achieved by giving considerable attention to the connection of the copper conducting cable to the carbon anode. One preferred arrangement is approximately as shown in Table 1.

Variety of Applications

Such rods are used in quite a wide variety of cathodic protection systems. For instance they are used in systems that involve coated pipelines

TABLE 1. CONNECTING THE COPPER CONDUCTING CABLE TO THE CARBON ANODE

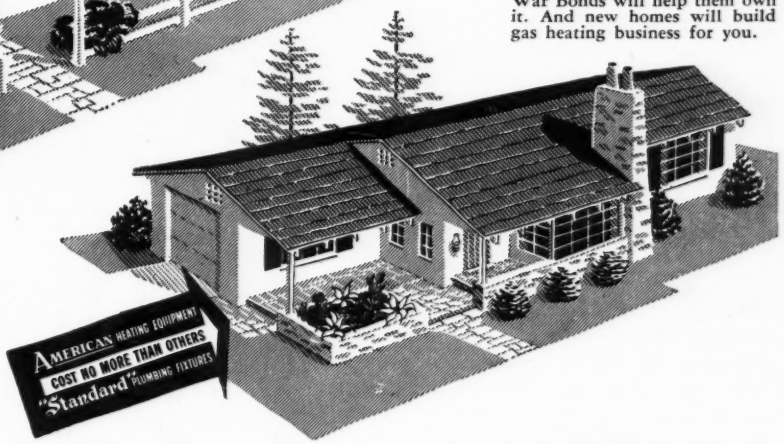
1. The end of the carbon rod is first bored and countersunk to make the proper sized recess to hold the connection.
2. Then impregnate the end of the rod for a distance of 6 in. or more, with melted paraffine to assist in keeping the connection dry. Paraffine impregnation is best done by stacking the rods in a vertical position in a closed vessel which can first be placed under a vacuum to remove most of the air from the pores of the rod. Then after introduction of the molten paraffine to the proper depth, pressure is applied to replace the vacuum which forces the paraffine into the pores of the rod. In this way, much more complete penetration is secured than if the end of the rod is merely dipped into melted wax.
3. A knurled copper ferrule, soldered to the end of the copper cable is then driven into a countersunk space in the bottom of the hole bored in the paraffined end of the carbon anode. The relative size of the hole and the copper ferrule must be closely controlled since this is the real electrical connection between the copper conductor and the ground rod. A tight friction fit is secured by driving the ferrule into position with the aid of a copper washer attached to the end of the ferrule. The insulation on the cable extends to the driving washer which is perhaps and inch inside the end of the rod. The copper and carbon are now permanently and securely connected both electrically and mechanically.
4. Protect the joint against the action of water. This is done by compressing a soft rubber gasket in the bottom of the space above the driving washer, placing a layer of soft pitch that will not crack in cold weather on top of the gasket and sealing in the soft pitch with another soft rubber gasket flush with the end of the rod. This connection is illustrated in Fig 1.

TODAY'S NEST EGGS...

will mean more gas heated homes tomorrow!

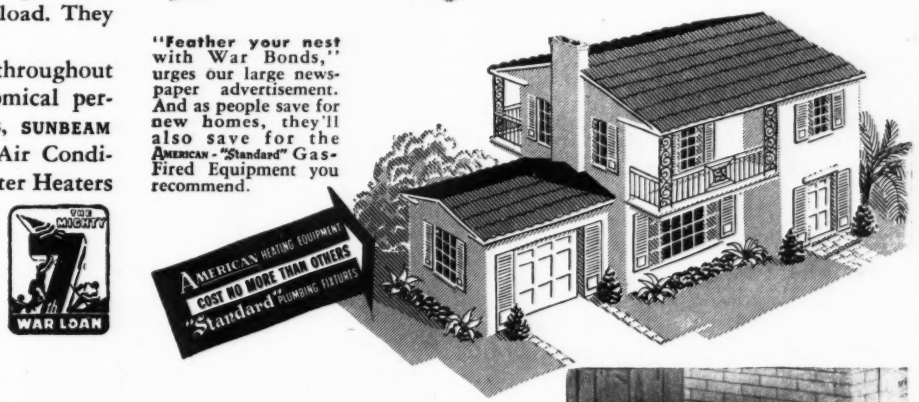
Featured this month in a national newspaper campaign, this charming New England home is selling plenty of War Bonds for Uncle Sam, building future business for you.

"Want this ranch house?" asks the AMERICAN-"Standard" newspaper advertisement of millions of Americans. They are told that War Bonds will help them own it. And new homes will build gas heating business for you.

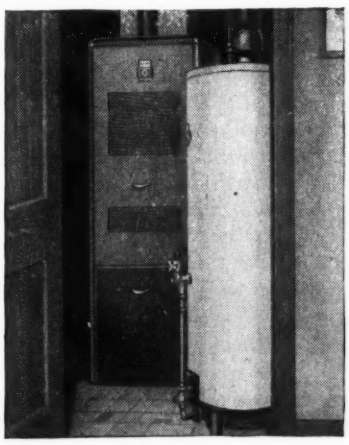


THIS MONTH 1061 newspapers, with a circulation of approximately 29,000,000, are featuring the AMERICAN-"Standard" advertisement showing these model homes and urging the purchase of War Bonds as a first step toward ownership. New Homes mean new gas heating equipment—and increased gas load. They mean profitable business for you.

During the war years, in homes throughout the nation, the dependable, economical performance of AMERICAN Gas Boilers, SUNBEAM Warm Air Furnaces and Winter Air Conditioners, and AMERICAN Gas Fired Water Heaters has won thousands of friends. When full production is resumed, homebuilders will be waiting to "follow the arrow" to your door.

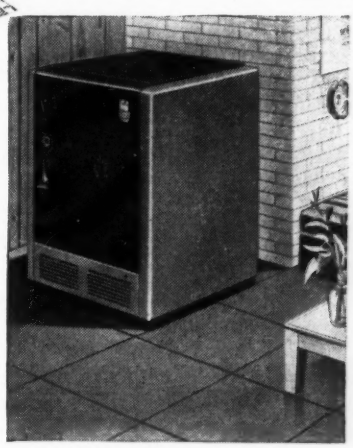


"Feather your nest with War Bonds," urges our large newspaper advertisement. And as people save for new homes, they'll also save for the AMERICAN-"Standard" Gas-Fired Equipment you recommend.



(Left) **Illustration shows** actual installation of a SUNBEAM Gas Fired Winter Air Conditioner and Budget Storage Water Heater in a utility closet of a small home. Also adapted for individual apartments, stores and similar space.

(Right) **The Empire Ideal Gas Boiler** will be first choice for the recreation room of that wonderful new home that many thrifty War Bond buyers are looking forward to owning after the war.



AMERICAN RADIATOR & Standard Sanitary

New York **CORPORATION** *Pittsburgh*

where cathodic protection is relied on to protect against corrosion of the steel when exposed by possible cracks or flaws in the coating. In these cases the electrical load is comparatively slight and therefore requires but few anodes or ground rods, since the parts of the coated pipeline that might become exposed due to injury or abrasion of the coating are comparatively small. Carbon anodes also are used to protect bare lines under the worst conditions in the so-called hot spots where the electrical loads are heavy, requiring a larger number of rods.

Many variations in electrical load per rod are encountered depending on the conductivity of the soil solution and the severity of the corrosive conditions. Loads as light as one-tenth ampere per rod are known. Also loads as heavy as 80 amperes per rod have been applied.

Installation

Rods have been applied in a horizontal position where they are laid with the aid of trenching machines. More generally they are installed vertically, being placed in holes dug by machine or by hand especially in those less accessible locations. They are sometimes placed in groups or beds 2 to 20 ft. apart depending on the soil solution conductivity or resistance. They also are applied in the distributed anode type of system where they are placed at frequent intervals near the pipeline. They have been applied in very wet locations where the rods were below the water table and also they are found in some of the driest places where there is almost no conductivity of soil solution due to lack of moisture.

The range of applications includes almost all possible variations of concentration of salts in the soil solution as well as the full range of amount of solution. The soils vary in quality from acid swamp waters to alkaline spots in the desert and from salt or sea water to locations beneath truck farms and gardens. They have been installed in isolated regions and also are found in refineries and cities where nearly every known type of structure and condition is near by. They have been used on pipelines carrying oil and gas and on water pipe systems, on tank farms and refineries and also in the interior of condensers, coolers and boilers.

It would thus seem that carbon ground rods have been found to be universally applicable as anodes in cathodic protection systems. This statement is made with the understanding that carbon or graphite rods are used only in externally excited systems. No protecting electric potential or current is generated simply by connecting a carbon rod through a copper conductor to a pipeline or other steel structure as is sometimes the case with anodes high in the electromotive series, such as zinc or magnesium. With carbon as with iron, an external source of power must be inserted in the circuit to provide the electric potential necessary to maintain the pipeline in the cathodic condition. This external source of power carries with it the advantage that the potential can be made of such voltage as is required to maintain the required current between pipe and soil so that protection is constantly secured irrespective of local variations in conditions.

All known commercially available sources of direct or unidirectional current have been used in connection with carbon ground rods. These include gas or gasoline engine driven direct current generators, various types of rectifiers operating on alternating current lines and windmill driven generators.

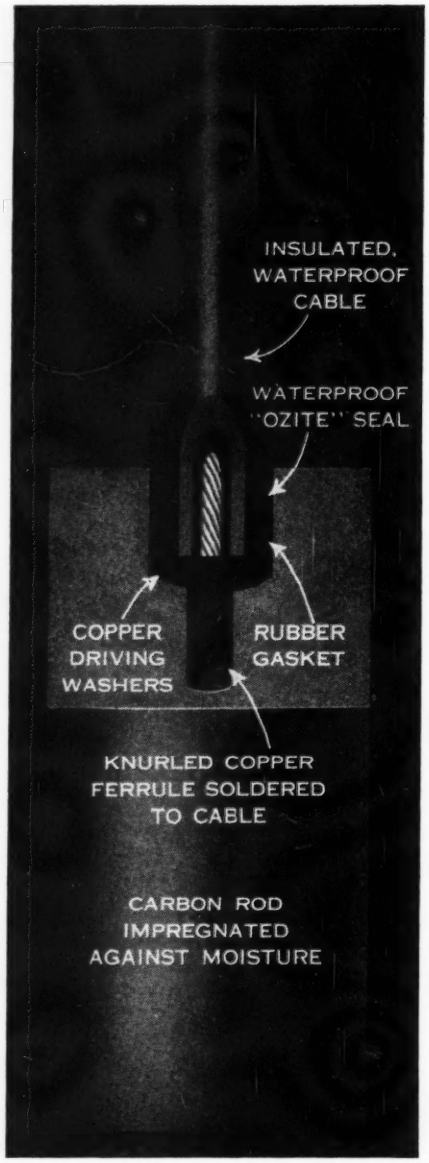


FIG. 1. Carbon ground anode.

In general, carbon is used to replace the steel or iron anodes of the conventional cathodic protection system without change in any other part of the system. That is, the current, surface area and location of anodes are similar to those used where iron is used as the ground rod. The required voltage is similar but not identical. As with iron installations, a complete investigation of pipe to soil potential, ground conductivity or resistance and other facts about each proposed installation must first be determined, from which data the engineer in charge can determine the necessary current, voltage, anode area and location required.

The area of ground rod surface required to produce a given current at a given voltage through a specific system is generally a function of the conductivity of the soil of the locality and does not vary much with different types of electrodes. Sometimes an attempt is made to use less carbon surface or area because it is believed that carbon anodes are more expensive than scrap steel pipe. This results in overloading the carbon anodes and getting high resistance of the circuit as a whole because frequently the soil near the limited electrode surface does not have sufficient conductivity to give the desired current-voltage relation.

Savings in Cost and Labor

Frequently the initial cost of a carbon ground bed installed ready for service is no more than that of a scrap iron bed. Over a period of years, it is almost always less expensive. There is no question but that scrap iron in a scrap pile near a pipeline is less expensive per pound than a good carbon or graphite rod that must be purchased and delivered to the approximate site of the ground bed. On the other hand, carbon rods are comparatively light in weight and therefore substantially simplify the job of transportation and installation. A man can carry a rod on his shoulder thus eliminating the requirement for large crews and heavy trucks. One man with a post hole digger can install most carbon rods. This saving in labor and equipment may make the installed ground bed of carbon rods no more expensive than an installed iron system.

Generally speaking, a carbon installation can be expected to last many times as long as an iron bed of equal surface area and electric load. The saving in the labor, equipment, and

other costs of replacing several ground beds over a period of years is believed to be a substantial one.

It is difficult to make an absolute, accurate and precise comparison of the life to be expected from various carbon and other ground beds because of the varying effect on life resulting from varying local conditions. Some general consideration of the factors involved will, however, indicate the nature of what is to be expected.

Corrosion or consumption of iron when used as an anode takes place from two causes. First, the consumption of iron as an anode is a function of the ampere hours or amount and time of application of current. Second, the local corrosion of the soil solution or the iron will occur even if no current is being used.

The first can be calculated at least approximately. The iron consumption is determined by the coulombs of electricity employed, the atomic weight of iron and the valence of the iron in the compounds produced. The figures indicate that an ampere year would consume a little more than 20 lbs. of iron if ferrous compounds are formed. To this must be added the local corrosive efects of the soil solution which might be any figure large or small but would always be added to the 20 lbs. consumed by the ampere year of current.

Calculating Carbon Consumption

For crude comparative purposes, we can use the figure of 20 lbs. of iron per ampere year as a minimum. The theory and calculation of carbon consumption is not so simple. The electrochemical equivalent of iron is readily determined from tables, or simply calculated. Carbon electrodes act in a much different fashion in cells with water solutions of electrolytes. Tables of electromotive series of elements do not show carbon. This is because carbon does not act as a carbon electrode but as an oxygen electrode. The carbon acts as a electrical conductor carrying current to the surface of the electrode. This surface in contact with a water solution is covered with a film of oxygen and it acts as an oxygen electrode. The current flowing from a carbon anode to a water solution generates oxygen which may or may not combine with the carbon to form carbon dioxide. This formation of carbon dioxide, if it occurs, does consume the carbon electrode.

The calculations of the rate indicate that even if perfectly efficient, this consumption would be only about one and ½ lbs. per ampere year but this amount may not be consumed because the efficiency of the oxidation may be considerably less than 100% in many soil solutions. The oxidizing potential varies greatly with different pH values and other individual variations in soil solutions. In addition to this low consumption of less than 1.5 lbs. per ampere year for carbon compared to more than 20 lbs. per ampere year for iron, there is no local corrosion of carbon to be added to this consumption. We may therefore say that theoretically carbon is 15 times as good as iron for use in ground bed installations. The surface required by particular soil solution conditions requires that there must be as much surface of electrode for one system as for another. We may not say, therefore, that we need only 1/15 as much carbon to make a ground bed, but we may say that the same weight of carbon will be expected to last fifteen times as long as the same weight and original surface area of iron anodes.

Oklahoma Enacts Conservation Laws

NEW laws enacted by the recent session of the Oklahoma Legislature are expected to aid the oil and gas industries and the Corporation Commission in reducing waste and increasing ultimate recovery of those natural resources.

House Bill 339 authorizes unitized operation and management of a common source of supply of oil and gas. If upon filing of a petition with the Corporation Commission, and proper hearings, that body shall determine that such operation is "reasonably necessary in order to effectively carry on pressure maintenance or repressuring operations, cycling operations, water flooding operations or any combination thereof, or any other form of joint effort calculated to substantially increase the ultimate recovery of oil and gas from a common source of supply".

To give the Commission authority to establish a unit a petition must be filed with authority of "lessees of record" of 50% or more of the area of the common source of supply or portion thereof sought to be unitized. The rights of minority lessees are protected by a provision that 15% of "lessees of record" in a unit area may secure the setting aside of a unitization order if they file a protest within 60 days after such order is issued by the Commission. Unitization orders and proceedings also are subject to court review, upon appeal.

While House Bill 339 does not become effective until 90 days after adjournment of the Legislature, a movement is now underway to file unitization management petitions applying to the West Edmond field. Pressure in this field in going down rapidly and efforts will be made to apply repressuring methods there before bottom hole pressures are so greatly reduced that it will be necessary to place the wells on pumps. A survey completed in mid-February showed a loss of pressure of one pound per day over a period of 90 days.

Application of a new law, House Bill 257, to natural gas production and distribution in the Oklahoma sector of the Hugoton field is asked in a petition filed with the Oklahoma Corporation Commission by Walker T. Pound, conservation officer of that body.

This bill, passed by the recent Oklahoma legislative session greatly strengthens powers of the commission in preventing waste of natural gas and in guaranteeing rights of property and royalty owners to their share of the proceeds from sale of gas from any well.

Floyd Green, attorney for the conservation department, explained at a hearing on the application held May 24, that the new law not only will permit the commission to limit drilling to one gas well on each section of land but will require unitization of the interests of owners of all rights on such a section to their share of the production.

Pound stated at the hearing that the new law will require some changes in Commission Order No. 17,410, issued January 1, 1945, under which drilling and production of gas wells in the Oklahoma Hugoton area are regulated at present. He also recommended that the revised order be issued effective as of June 1, this year. The Commission took the application under advisement.

Carbon Black Plant Application Withdrawn

The J. M. Huber Corp.'s application with the Louisiana state conservation department for a permit to construct a carbon black plant in the Reddell area in Evangeline parish was withdrawn the latter part of April by the company.

P. A. Frye, chairman and executive director of the Louisiana Natural Gas Conservation Committee, said he was "gratified" to learn of the withdrawal of the application as the committee was "flatly opposed" to the manufacture of carbon black in Louisiana from any but "waste" or "sour gas."

The C.R.C. Machine for Bending Cold Pipe

FIG. 1. First machine with half shoe.

FIG. 2. Double bending shoe, open position.

WHEN the war emergency pipelines, or "Big Inchers" were being considered, one major problem to be solved was the cold bending of large diameter pipe. Formerly, pipe larger than 12 in. in diameter had not been bent successfully in the field without heating. Thus it became evident that a cold bending machine was urgently needed.

As a result, Crutcher-Rolfs-Cummings, Houston, undertook the building of such a tool, which was developed and used on most major diameter pipelines laid since the war.

The first machine was built with a half shoe (Fig. 1). The double shoe machine, developed later, became the one most used (Fig. 2).

There are two methods of cold bending large diameter pipe of 16 in. and larger diameter:

(1) *Stretchbend:* This applies to thick wall pipe where stretch does not seriously affect wall strength; (2) *Wrinkle Bend:* Used on thin wall pipe, where there is insufficient metal to allow for distortion.

By using a solid shoe for the stretching method and a slotted shoe (Fig. 2) for a wrinkle bend, the machine accommodates both methods.

TABLE 1. SPECIFICATIONS FOR COLD WRINKLE BENDING OF 20 AND 24 IN. PIPE

Method Employed: Wrinkles shall be made by using an internal expanding "jig" in the pipe, and expanding the pipe at the point being bent, during the time the pipe is being pulled while in an approved type bending machine. Fig. 4 shows this "jig," and a pipe in position to be bent. No stretching or thinning of the pipe wall thickness shall be permitted; and only one wrinkle shall be made each pull.

Degree of Bend: Optimum degree of bending per wrinkle shall be 1½°; maximum, 3°. An accurate method of measurement shall be used.

Wrinkle Jig: The internal jig shall be so designed as to produce wrinkles having lengths not greater than 45% of the pipe circumference. The width of the wrinkle at its center shall not be less than 5 in., and the height at its center shall not be greater than 1 in. The wrinkle shall be tapered toward each end.

Spacing of Wrinkles: Distance between centerlines of wrinkles shall be such that there will be no distortion of the pipe nor wrinkle previously made. No wrinkle shall be made nearer than 6 ft. 0 in. to the end of the pipe.

Imperfect Wrinkles: Wrinkles having excessive twist or non-uniformity shall be removed. Wrinkles having too high crowns shall be removed. Any wrinkle containing any buckling shall be removed.

The intent of the above specifications is to produce wrinkle bends which will minimize the distortion of the pipe, and which will not in any way impair the strength of the pipe.

The specifications in Table 1, drawn by engineers of a major pipeline constructed with thin wall pipe, were designed to give a natural displacement of the steel in a wrinkle form, rather than an abrupt kink along the side of the pipe. Fig. 3, showing a section of pipe containing over-bends and sags together with wrinkles made to form them, gives an idea of the efficiency of this machine, used on all bends up to 45° on this particular line. Fig. 4, shows use of internal expanding jig in making a bend.

During construction, many samples were cut from the bends for testing. Results were satisfactory. The line has operated successfully for some time at 750 lb. pressure.

FIG. 3. Section of pipe with wrinkle bends. Photo: Barrett Division.

FIG. 4. Making a bend, using the internal expanding jig.

POST-WAR NOTES and NOTIONS

By STANLEY JENKS

Still Fighting

The war has still to be won. Only in one phase of it—Europe—has fighting ended and a complete military victory been won. The Jap war, which many sound military thinkers consider a far bigger job than we faced in Europe, demands a continued all-out American war effort, and there seems little likelihood of anything more than a minor easement in our wartime controls until we are ready to throw the kitchen sink at the Japs, and have several kitchen sinks available in case we fail to hit the first time.

Taxation will remain at abnormally high rates, it seems. Controls will remain to assure an adequate supply of men and materials into the Pacific, and under such conditions, there can be nothing but a shadow of the postwar we all are anxiously awaiting, so long as the war continues.

Glimpses

Stanley Jenks

There are, however rays of sunshine or something filtering through the war clouds.

For example, the electric range lads are back on the job, tooting their horns in the national publications.

Apparently, they have added little but more superlatives to their claims. Those of us who have sold electric ranges as combination utility men on rural lines beyond the gas mains know what they are up against. For example, did you see a recent electric range advertisement? Trying to talk his way out of the lack of flexibility in the top burners, this electric cookoo-ery advertiser puts it "a variety of current-saving cooking speeds from low simmer to fast frying heat. A choice of accurately controlled, scientifically planned cooking heats for every cooking job. Saving on current, saving on vital food values, saving on money." Blah-blah-blah! And all this to explain a complicated, vulnerable, relatively expensive switch arrangement, which cannot begin to match in effectiveness the simplicity and flexibility found in our standard gas burner cock.

To his eternal credit—or am I too generous?—there was no mention of cooking a roast with high frequency units in two minutes flat, or built-in radios to relieve the housewife's boredom, now that she has nothing left to do in the kitchen but push buttons and look as spic and span and as winsomely beautiful as she does in the advertisement.

Flame Cooking

Postwar too, it would seem as though the old prewar practice of slandering gas cooking is going to be given another whirl. This electric range manufacturer offers "clean, cool kitchen—*without flame-smudged pot and pans*, and *unsightly stove pipes* (our italics). So well insulated that sumertime cooking is no drudgery."

Of course, every intelligent man or woman acquainted with modern gas cooking knows that there isn't a gram of soot in a billion cubic feet of gas deposited on a utensil or anywhere else with a properly adjusted gas burner.

So such a crack is either directed at the hundreds of thousands of wornout, obsolete gas ranges, which must be replaced as soon as possible to protect our postwar gas cooking load, or else it is sheer misrepresentation as far as today's gas range performance is concerned.

Of course, and running true to prewar form, it can be anticipated that when challenged, our electic range lad will claim he had oil and coal stoves in mind all the time. He wouldn't dream of using the silk handkerchief test competing with us.

I wonder, especially if we let him beat us to it in replacing those obsolete gas ranges.

No Kidding

In the same magazine in which this electric range advertisement appeared, one of our gas range manufacturers had an advertisement, which hit a highly commendable level in sound promotion.

Very realistically, the gas range manufacturer stated that his product, under existing priority limitations, is available with exactly the same desirable qualities and features it offered before the war.

I think his promotional logic is right. The public is fed up to the teeth with fantastic postwar promises, and is hungry for the amenities of life it willingly gave up to fight and win the war.

As it happens, I have friends right now, typical of millions no doubt, who are remodelling a run-down place for their future home. I know when it comes to kitchen equipment they'll gladly settle for a gas range as good as the one she wanted before the war.

That goes for almost everything. It will be a considerable postwar achievement to be even able to pick up promptly where we left off in appliance design and development.

Newness and originality are not unmixed blessings. Not everything new is good, nor is everything old necessarily bad.

TRENDS AND COMMENT

RADIO PROGRAMS

A Review of What Some Companies are Offering to Aid and Entertain Their Consumers.

In order to "advertise the superiority of gas and to implant the seeds of future buying desire by creating a preference for the inimitable service that gas can render," the *Washington Gas Light Co.*, Washington, D. C., is sponsoring a half-hour radio program called "The Wonder Flame," is presented each Thursday evening at 7:30 P. M. over radio station WMAL.

This radio offering is basically a diversified entertainment program consisting of musical and dramatic elements. The name of the program, aimed to suggest the superiority of gas service each time it is heard, leaves no doubt as to the sponsor's identity. A special theme, the program's own quartet and other units of the show bear the program name, helping to further establish it with the listening audience.

Billed as a "Full half-hour of melody and story," the show is entirely devoid of conventional "commercials." Opportunity for the sponsor's message is provided in narrations by the Voice of the Wonder Flame, who discourses imaginatively on a variety of interesting topics into which are skillfully woven some promotional story of gas service.

The Hartford (Conn.) Gas Co. is also using radio as a media for advertising, for the purpose of plugging the New Freedom Gas Kitchens and year 'round air conditioning. Eleven spots each week on three local stations is the present schedule. Here is a typical message:

"Look what's ahead! More freedom —more fun for you, Mrs. Housewife —when Gas—the Magic Flame— comes into your home! Comfort and convenience beyond your fondest dreams, in a New Freedom Gas Kitchen, and a house heated and air-conditioned by gas! The Hartford Gas Co. says: Buy bonds today—to have this all-gas home tomorrow!"

The *Portland (Ore.) Gas & Coke Co.* is another utility currently sponsoring a radio program. Called "Let's Talk Houses," this program is presented each Saturday at 6:30 P. M. on station KXL. Each weekly broadcast covers a different phase of home building and features a panel discussion by a different group from the Home Builders' Association. Brief commercials tie in with gas for heating, cooking, water heating and refrigeration in tomorrow's homes.

Topics for the thirteen weekly broadcasts scheduled to run through midsummer are: How to Go About Getting a Home Built; Financing the Home; Relations of Contractor and Architect; Actual Construction; Use of Materials; Making Plans; New Gadgets for Postwar Homes; Plumbing, Heating and Lighting; Interior Finishing; Landcsaping; What Women Want in a Home; and Review and Conclusions.

Southern California Gas Co. recently received a letter from a soldier stationed in Culver City, Calif., which indicated the popularity of the company's Evening Concert program. The letter mentioned a large, appreciative audience on the post and requested information as to how to obtain the printed program, stating that one program could be used by at least 20 servicemen.

The presentation, now in its fifth year, offers recordings of the best in music every evening except Sunday from 8 to 10 p. m. Programs are available only through gas company offices. When the Concert program was first offered, 4000 programs were printed. Today the 25,000 programs printed each month attest the popularity of the offering.

DISABLED VETERANS

American Veterans Association Asks That Industry Act Now to Create the Many More Jobs Needed.

Much has been said about the joint responsibility of government, the individual, and industry toward the disabled veteran. The time for action, if it has not already been taken, is at hand.

The objective is clear—a wide assortment of suitable jobs, available when and where they are needed, throughout all industry, large and small.

Many more jobs are needed. That industry's ability to provide jobs for physically handicapped veterans has so far presented no problem, must not be allowed to induce complacency. The number of disabled veterans looking for placement in industry so far has been a relatively small trickle, but that is no safe indication of what may be expected in the future.

The American Veterans' Association, national headquarters, 271 Madison Ave., New York 16, outlines what to do and how.

Appoint someone whose specific duty it is to fit the available jobs in your organization to the capabilities of disabled veterans. Do it now. The man doesn't need to be a psychiatrist or medical expert; his chief prerequisites should be common sense, good

The Equitable Gas Company of Pittsburgh got behind the mighty 7th War Loan Drive with this gaily decorated float, which appeared in the War Loan Drive parade, Monday May 14. The parade—made up of war heroes, two-score bands, army vehicles, floats of war industries, and smartly uniformed men and women from volunteer organizations—was the biggest in Pittsburgh's history.

intelligence, and human understanding.

The American Veterans' Association will be glad to supply information about what others have done or what methods and practices are recommended by authorities.

MISSISSIPPI GAS

With 18 fields discovered production activity is reaching record levels.

The potentiality of Mississippi becoming an important oil and gas-producing state is becoming increasingly apparent. Eighteen fields have been discovered so far in the state, three which have been productive of dry gas.

Drilling activity this year has already climbed to a new record level, with a total of 80 rigs now running in the state, an increase of more than 25 since the first of the year. Of the 80 active operations, 30 are in areas so far unproductive and scattered over 22 counties.

In 1944, more than 200 wells were drilled, including unproductive tests, and this number is expected to be increased at least 50% during 1945. More than 85 wells have been completed, including 45 producers, already this year, and appropriations of most of the companies now operating in the state provide for the drilling of a greatly increased number of wells during the remainder of the year.

EMPOYEE HEALTH

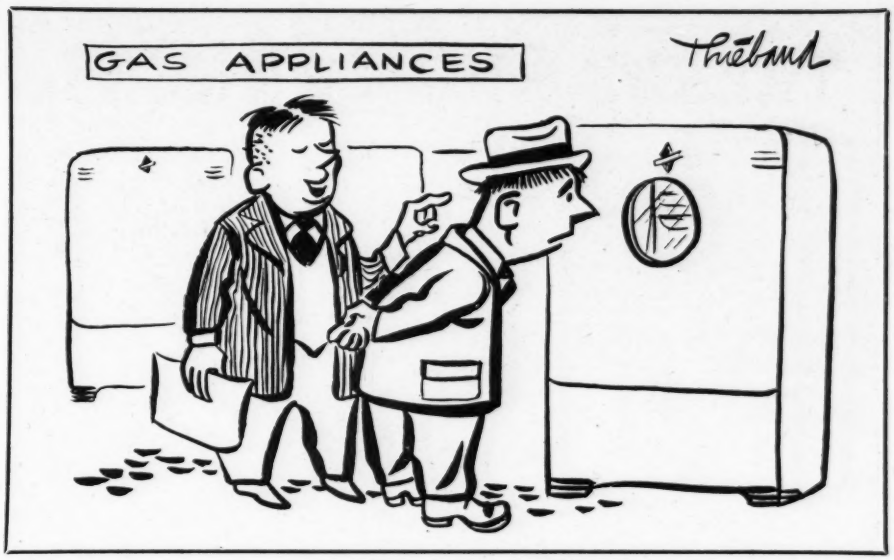
For 75c monthly members of this Texas utility group plan receive maximum annual benefits of $200.

For the purpose of providing hospitalization for its members, the employees of the City Public Service Board, San Antonio, Texas., organized the "Public Service Health Club" in December, 1943. The Club is entirely independent of the City Public Service Board—its officers are elected annually and receive a salary of $10 per month. The dues of the members are deducted by the payroll department and arrangements have been made with all San Antonio hospitals to accept any member of the club in case of sickness.

The organization provides hospitalization for employees of San Antonio Public Service Co., a municipal utility.

After 10 years of operation the club now has a membership of 336, with a surplus of $9440.83. During these 10 years, the club has paid a total of $22,109.58 in claims to its members, and these claims were paid promptly.

The monthly dues are only 75¢, and this provides a maximum benefit of $200 per annum which includes the following: for a maximum of from 18 to 24 days per annum. $7.00 per day for private room, board, general nursing, care supervision, special nurses, if and when, at the discretion of the attending physician such are necessary; regular laboratory routine, blood count, urinalysis, and dietician service; the use of the operating room as often as necessary during each authorized entry; surgical dressing not to exceed $10 for each entry into the hospital; drugs and medicines not to exceed $10 as prescribed by the attending physician; anesthetics, and the administration thereof not to exceed $15; X-ray $10 per entry; for cardiograph, $10 per entry; for doctors bill up to $35 for hospital cases only; and ambulance service.



"With this model you can actually see that the light turns off when you close the door." —SoCalGas*Co Dealer News.*

HOME HUMIDITY CONTROL

Now is the time to tell builders, architects, home owners the true facts about internal moisture and the ventilation required for its control.

The gas industry is being given a black eye in some quarters as the primary cause of internal moisture conditions in the home.

This is particularly true, according to reports, in colder climates, where internal moisture difficulties are encountered in prefabricated homes due to tightly sealed joints, weather stripped doors and windows, and other measures taken to insure protection against the elements. Such houses lack involuntary or uncontrolled ventilation, and occupants are naturally reluctant to deliberately open windows, when intent upon keeping themselves warm. Under such conditions internal moisture is bound to occur, and certain interests are laying the responsibility for this condition at the door of the gas industry, asserting that internal moisture conditions are caused by the combustion of gaseous fuel,

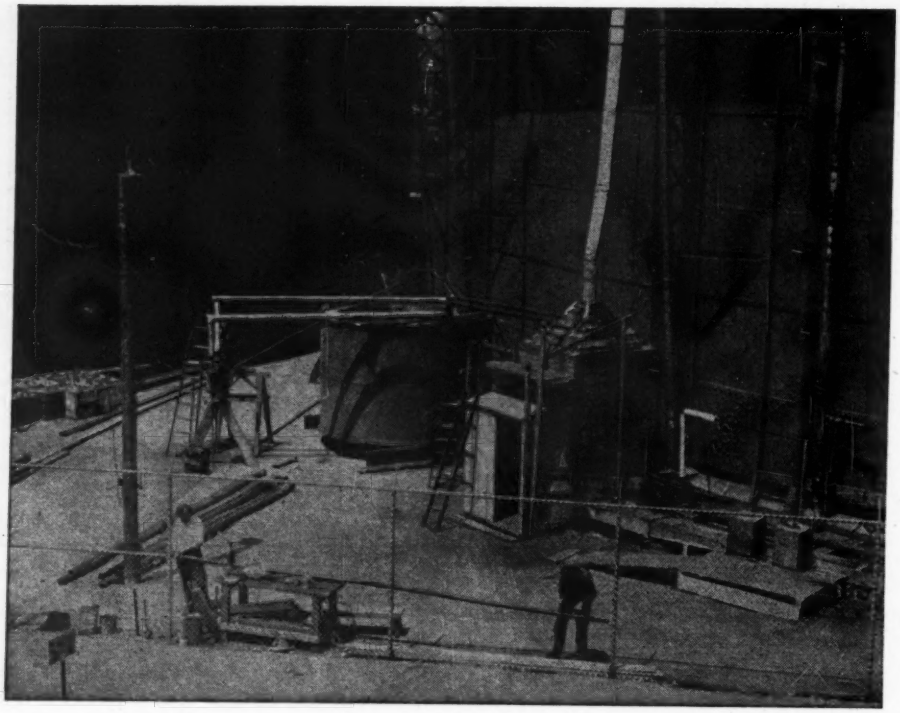
Anyone with an engineering or technical background would immediately realize the injustice and prejudice of this accusation. The unvented products of gaseous combustion, as it occurs in a home, produces a negligible amount of water vapor in comparison with such other household activities as cooking, dishwashing, home laundry, bathing, the watering of potted plants, mopping floors, and general cleaning and spillage.

Unfortunately not everyone in the building industry is aware of the facts. Now, therefore, would seem to be the time for the gas industry to actively present the complete story of home humidity control to builders, home owners, architects, salesmen and all directly or indirectly engaged in the construction, promotion, sales and use of housing facilities.

These facts should be presented in layman's language, but on an engineering basis and not merely as gas utility propaganda.

To accomplish the purpose, it is recommended that there be an engineering study of the whole problem of household ventilation, backed up by laboratory or field experimental data, if necessary, and including the elements of ventilation, sanitation, and normal operation of a home—pointing out the various sources of odors and air visitation which will always require minimum ventilation.

It would seem that the current study on kitchen ventilation, which we understand is in progress, would in a large measure provide the facts which must be disseminated throughout all divisions of the building trade at the earliest possible moment.



A view of the equipment used by The Brooklyn Union Gas Co. to remove mulsified drip oils and dissolved gas from the water in the holder tank before letting the water flow into the city's sanitary sewers. At left is steel tank containing coke which served as a filter. Wood structure at right of tank is aerator. The flume, with sodium hypochlorite drips is visible in right foreground

Cleaning and Repairing A Water-Sealed Gas Holder

By ROBERT I. WARNECKE

Superintendent's Assistant, Holder Distribution

The Brooklyn Union Gas Co.

EARLY on the morning of Jan. 4 of this year, during a sleet storm accompanied by high winds, one of two 5,000,000 cu. ft. gas holders at our Flatbush Station failed to function properly while gas was being admitted for storage and distribution. The extent of the failure and the cause were not definitely known at the time. Subsequent examination by the Bartlett Hayward Co. and our own people established certain facts which prompted us to limit its operation for the remainder of the winter season.

Gas holder inspection, operation, and maintenance are largely a matter of routine. In compliance with rules and recommendations of the Public Service Commission pertaining to the internal inspection of gas holders, it was planned to make an inspection of this fuel bin in 1942. However, this program was interrupted because of the war.

There are four principle phases in the major repair of a water sealed gas holder:

In Phase I, the work was completed according to standard practice without unusual events.

Before removing the water from the tank, we entered the holder through one of the 30 in. inlet mains and from rowboats we were able to observe the operation of the holder from the interior as it was raised with air supplied from a blower. We found the fourth cup damaged at two places and the grip of the fifth section badly bent. The shafts of a number of internal cup rollers had been dislodged, and these rollers no longer served to guide properly the travel of the section. Undoubtedly this caused the damage to the cup. The rollers were reassembled from the boats and an internal inspection was made by a representative of the Bartlett Hayward Co.

In Phase II, the disposal of the 8,500,000 gallons of water in the tank was a problem of some concern. This holder is located in a residential section of Flatbush and is only a half block from the King County Hospital. It was necessary to discharge the water into city sewer mains which serve as sanitary sewers for thousands of our customers' homes along the line. The water in the tank contained considerable amounts of emulsified drip oils and dissolved gas. We had reason to believe that this water, if discharged directly into the sewer without treatment, would create a nuisance to many of our customers and might be costly to the company.

With the able assistance of our Laboratory, we experimented with a small pilot plant and finally built a water treating plant which consisted primarily of a coke filter, aerating tower, and provision for chemical treatment.

The water was first syphoned out of the tank into a coke filter which consisted of a steel tank, 12 ft. in diameter, containing about 13 tons of range size coke. From the filter, the water was pumped, meanwhile being preheated, into the top of the aerator, which was a wooden structure having a series of wooden baffles which served to break up the stream of water. A blower in the bottom of the tower blew air and steam which was introduced at the bottom in counterflow direction to the water. The gassy vapors were discharged through a 100 ft. canvas stack attached to the top of the tower. The water flowed from the tower in a wooden flume to a sewer catch basin.

Sodium hypochlorite, a strong germicidal agent, was added in small quantities at the head of the flume and was well mixed with the water as it flowed to the catch basin. The chemical treatment was coordinated with the flow of sewage. During periods of heavy flow less chemical was added, and during the night and early morning the amount was increased.

This method of treatment proved effective. It was originally estimated that with chemical treatment alone, 2500 gal. of sodium hypochlorite would be needed per million gallons of water. Actually we used only 180 gal. per million. This did represent a saving, but of far more importance

PRINCIPAL STEPS IN WATER-SEALED HOLDER REPAIR

Phase I—Severing all gas connections. Purging.

Phase II—Emptying water from the tank. Removing sediment from tank bottom.

Phase III—Inspection and repairs to interior of holder.

Phase IV—Refilling tank with water, purging and connecting gas to holder.

to us was the fact that as far as I know, the company received only one complaint of odor that might possibly have been traced to the sewer main used.

After the removal of the clear water there remained in the tank approximately 83,000 gal. of emusified drip oil and 625 tons of sludge.

The drip oil was for the most part probably an accumulation of deposit from our district main drips which was dumped into the tank of this holder some years ago. The coke was removed from the coke filter tank and the drip oil pumped into it. Some heavy sludge settled to the bottom and the oil was pumped into our drip trucks and hauled to Citizens Works for disposal in the separators.

The remaining 625 tons of sludge was hoisted from the tank bottom and hauled away to the city dumps. This work was done by a contractor in 16 days.

With tank bottom cleared we entered Phase III. A holder is essentially a rather simple structure, but because of its size it is constructed of many component parts all of which have rivets, bolts or welded joints. This particular holder was constructed with approximately 750,000 rivets and thousands of nuts and bolts. A number of rivets and bolts were found to be weakened largely because of corrosion. Several thousand rivets, bolts, and nuts were replaced and rivet heads which were badly corroded were built up by arc welding.

Small Repair Items

There were many other seemingly small items of repairs which were done but each was very important to insure safe and proper operation of the holder. Most of the repairs were between or under the landed sections of the holder, and the confined working space made the task both tedious and time consuming. Repairs to the damaged sheets and much of the welding was done by an outside contractor.

On the suggestion of one of our employees, a wooden staircase was installed from the crown of the holder to the tank bottom. This staircase, which can be removed and used again, replaced the 50 ft. straight ladder which customarily was used to reach the bottom of a tank. This innovation proved to be a great convenience to both workmen and supervisors who formerly were obliged to descend the straight ladder in a safety harness, one at a time. One slip on the ladder without a safety belt might mean a sheer drop of 50 ft. to the steel bottom of the tank. Furthermore, it is estimated that approximately 1000 man hours were saved by its use.

Incidentally—and this is a credit to the men who worked on this job—the cleaning of the holder was completed without a single disabling injury.

In Phase IV it was necessary to obtain approximately 8½ million gal. of water to refill the tank. This amounts to about one third of the daily output of the New York Water Service Corp. which serves this area.

Water normally supplied from street hydrants at this location would take approximately three weeks time to fill the tank. In order to save time and insure a continuous supply, a 6-in. line was run directly from one of their wells located across the street and water was discharged directly into the holder tank at a rate of approximately 2,000,000 gal. per day. This operation was completed in about four days time.

After rewatering, the boats were launched again and the internal rollers adjusted as the holder is operated with air.

Final purging and connecting the gas mains completed the job. The holder was put back in service in November of 1944.

High Altitude Approval Requirements Adopted

SPECIAL high altitude approval requirements for gas appliances designated for use at altitudes above 2000 ft. have been adopted by the Approval Requirements Committee, a sectional committee, of the American Standards Association. The new requirements became effective immediately following their adoption April 13 and are expected to be accepted by the American Standards Association in the near future as American Standard.

The American Gas Association Testing Laboratories are prepared to test ranges, space heaters, central heating appliances, and water heaters under the new requirements immediately, these being the classes of appliances affected by the action. All other types are expected to be covered later. High altitude requirements for hotel and restaurant equipment are in preparation at the present time.

Generally speaking the new requirements cover gas equipment operating on all gases including liquefied petroleum and butane-air. Specific tests are provided for combustion as well as for performance of main and pilot burners and draft hoods. High altitude is defined as any elevation between 2000 and 5200 ft.

Appliances approved for high altitude use will bear additional markings indicating such use together with their high altitude input rating for all burners except those for which minimum ratings are specified. Tests for high altitude approval will be conducted at low altitude on natural gas with main and pilot burners adjusted at normal test pressure at 26% above the manufacturer's specified high altitude gas input rating. Where constructional changes are made for use at high altitude over that at low altitude, such additional tests as these changes may necessitate will be conducted.

This test procedure is equivalent to testing at 5200 ft. elevation above sea level at the rating specified. It was adopted after exhaustive experimentation with both this test method and one employing a special chamber at the National Bureau of Standards in which any desired altitude condition could be duplicated. The special chamber method was considered impractical because it would be more expensive and time-consuming and furthermore would be impractical and inconvenient for manufacturers to employ for development purposes. On the other hand the method adopted could easily be employed by manufacturers in their own testing operations.

The new requirements will benefit approximately 1,200,000 people in the Rocky Mountain area, the majority of cities in this area being located at elevations of from 3000 to 8000 ft. For altitudes above 5000 ft. the approved high altitude input rating should be reduced by 5% for each 1000 ft. increase in elevation.

Three Industrial Gas Conference Papers Available

Three of the papers prepared for presentation at the A.G.A. Conference on Industrial and Commercial Gas, scheduled for Toledo, O., March, 1945, but cancelled because of ODT regulations, were: (1) "The Plus and Minus of Induction Heating", by W. Wirt Young, W. Wirt Young & Associates, Waterbury, Conn; (2) "New Developments in Infra-Red and Convection Ovens", by Charles C. Eeles, industrial engineer, the Ohio Fuel Gas Co., Toledo; and (3) "It's Your Advertising —Why Not Make it So!" by John D. Keane, account executive, Ketchum, MacLeod & Grove Inc., Pittsburgh. Copies of these papers are available without charge upon application to the secretary of the industrial and commercial gas section, American Gas Association , 420 Lexington Ave., New York 17.

ASSOCIATIONS

NEGA To Hold Home Service Conference

THE Home Service Group of the New England Gas Association has completed plans for the holding of a five-day Home Service Development Conference in Boston, September 17-21.

Speakers and lecturers will address the Conference on a variety of basic subjects of direct interest to gas company home service representatives as follows:

General Background: History of the gas industry; History of home service.

Consumer Education: Home calls-Visual aids; Radio in home service; Press contacts.

Appliance and Equipment Servicing: Ranges, water heaters, refrigerators, kitchen heating, space heating, air conditioning and commercial appliances.

Miscellaneous Discussions: Manufacture of gas; Possibilities of home service in revenue building; The conducting of surveys; Gas equipment coordination; Kitchen planning; Speech training; and Appraisal of postwar gas appliance developments.

The NEGA Home Service Educational Committee, under the chairmanship of Mrs. Lillian Dunbar of Cambridge (past chairman of the NEGA Home Service Group), with the aid of about 15 consultants, has been preparing plans for this Conference for almost a year. During the first part of the committee's work, Mrs. Hazel Cheever of Arlington was the chairman of the NEGA Service Group. Miss Susan A. Mack of Boston is the present chairman of the group, which operates as part of the NEGA Sales Division of which R. E. Finnin, Boston, is the Chairman.

New England gas company managers were found to show a widespread interest in sending their home service representatives to the Conference, which will be held in compliance with ODT requirements.

Training Course

For the purpose of giving the new home service representative a well-rounded background in all of the factors needed in connection with her work, the Home Service Development Program Subcommittee of the Educational Committee has also prepared a comprehensive outline of text material which will be used as a training course in the local gas companies. This training program will require between one and two months of study by those who take the course.

The outline for this company training course covers the following pertinent gas industry fundamentals:

(1) A study of gas equipment.

(2) The Techniques and operation of home service work and sales training.

(3) Information on company organization, rate schedules, and other company, technical and home service subjects of value to new employees.

Wisconsin Utilities Ass'n Elects New Officers

The one-day war conference of the Wisconsin Utilities Association which was substituted for the four annual conventions usually conducted by the Association, has been eliminated this year in order to cooperate with ODT meeting regulations.

The following new officers were elected by mail ballott: M. H. Montross, vice president of the Wisconsin Public Service Corp., Wausau, was elected as president succeeding S. B. Sherman, who becomes chairman of the Association's advisory committee; B. E. Miller, manager rate and valuation department, Wisconsin Power & Light Co., Madison, was elected vice president; and Alfred Gruhl, assistant research engineer, Wisconsin Electric Power Co., Milwaukee, was re-elected treasurer. The terms of the new officers became effective as of May 1.

Heating-Air Conditioning Council Holds Meeting

The Metropolitan Gas House Heating and Air Conditioning Council held its annual meeting May 16 at the offices of Consolidated Edison Co. of New York, Inc., New York City. John J. Wholey, Rockland Gas Co., Spring Valley, N. Y., was elected chairman of the organization; Edward J. Gerridge, The Brooklyn Union Gas Co., was named vice-chairman; and James E. Cook, Westchester Lighting Co., Mt. Vernon, N. Y. was elected secretary-treasurer.

A summer meeting of the Council will be held July 27, under the leadership of William J. Schmidt, Long Island Lighting Co., retiring chairman.

L. C. Smith New President of Pennsylvania Gas Ass'n

Louis C. Smith, president of the Harrisburg Gas Co. since 1935, was elected president of the Pennsylvania Gas Association at their 37th annual meeting, held May 16. He succeeds Charles K. Steinmetz, Pennsylvania Power & Light Co., Carlisle, Pa.

Smith joined United Gas Improvement Co. in 1908 and since then has been associated with the Omaha Gas Co., was president of the Fulton County Gas & Electric Co., and vice president of New York Power & Light Corp. He has also served as assistant managing director of the American Gas Association.

H. G. Horstman To Lead Indiana Association

Herman G. Horstman, Public Service Co. of Indiana, Inc., was elected president of the Indiana Gas Association at the group's 35th annual meeting held in Indianapolis May 3. Because of wartime travel restrictions, a one-day session of board members and key company executives took the place of the association's annual convention.

H. G. Horstman

Other officers elected at a recent meeting of the Association's board of directors are: E. Dell Anderson, Northern Indiana Public Service Co., Hammond, vice president; and Paul A. McLeod, Public Service Co. of Indiana, Inc., re-elected secretary-treasurer.

Compact Commission to Meet In Oklahoma City in June

The natural gas industry will occupy the center of the stage at the Summer quarterly meeting of the Interstate Oil Compact Commission in Oklahoma City, June 14-16, Earl Foster, Commission secretary announces.

Because of wartime travel restrictions no effort was made to bring out a large attendance but each of the 14 states, now members of the compact have indicated their intention to be represented, some by their Governors, and all of them by other regularly accredited official representatives.

Panel discussions are to be conducted by three outstanding authorities in the natural gas industry, Foster says.

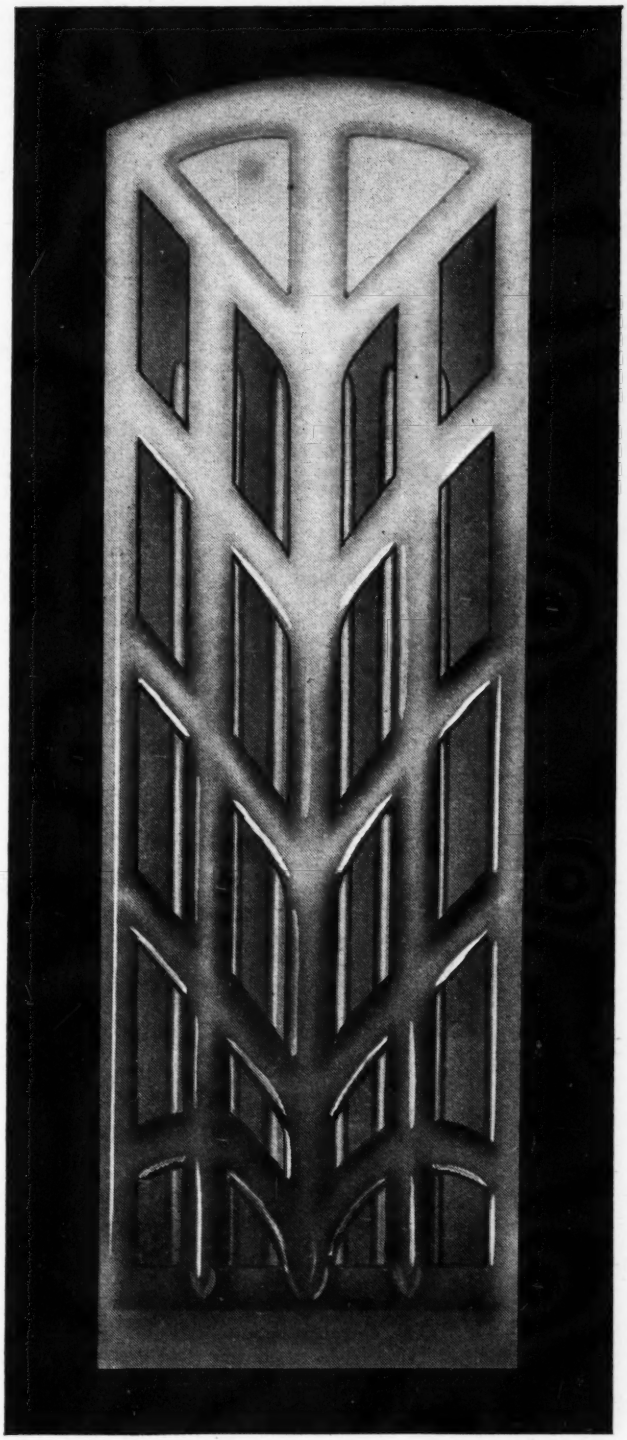
Ninth A.G.A. Southwest Personnel Conference Held

The ninth meeting of the American Gas Association Southwest Personnel Conference was held in Shreveport on June 5. M. V. Cousins, personnel director of United Gas Pipe Line Co., was chairman of the conference. Personnel problems such as experience with revised selective service regulations, wage stabilization, reemployment of veterans, foremanship training, and foremen's relationship to management were discussed.

$2,000,000 To Be Spent In Expanded Research Program

The American Gas Association has announced that nearly two million dollars will be spent over the next three years to develop improved methods of producing and utilizing gas for the benefit of its 20,000,000 customers in home, commerce and industry. This expanded research program is being developed and directed by leading qualified executives and engineers of the industry.

Under this program, the scope of the Laboratories will be greatly ex-

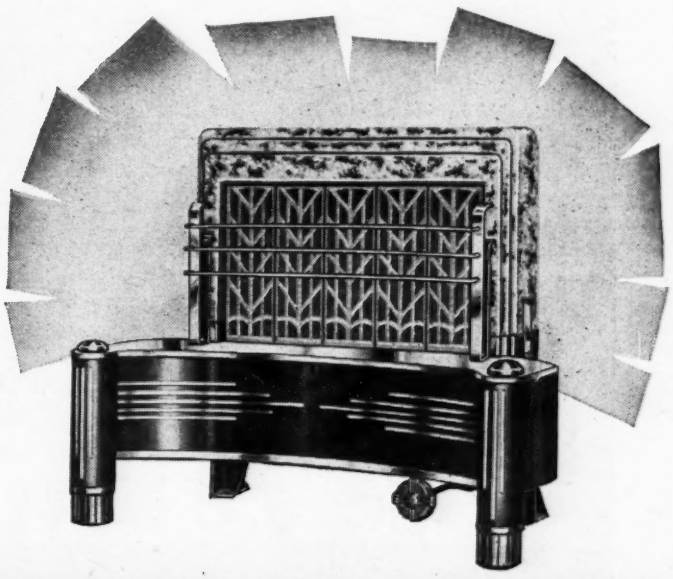


One Big Reason

HUMPHREY RADIANTFIRES *Lead The Field!*

Beautiful in design and scientifically constructed to obtain the maximum efficiency from the gas burned, Humphrey Radiants contribute greatly to the Leadership enjoyed by Humphrey Radiantfires from coast to coast. Humphrey Radiants are light, porous, and specially processed to produce an abundance of pure, radiant heat.

All current model Radiantfires are equipped with self-glazing radiants which upon burning acquire a beautiful, permanent glaze. Radiants are available for every Radiantfire, new or old. Write today for catalog sheet showing radiants for all models.



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REMEMBER THIS MARK OF QUALITY

GENERAL GAS LIGHT COMPANY KALAMAZOO, MICHIGAN

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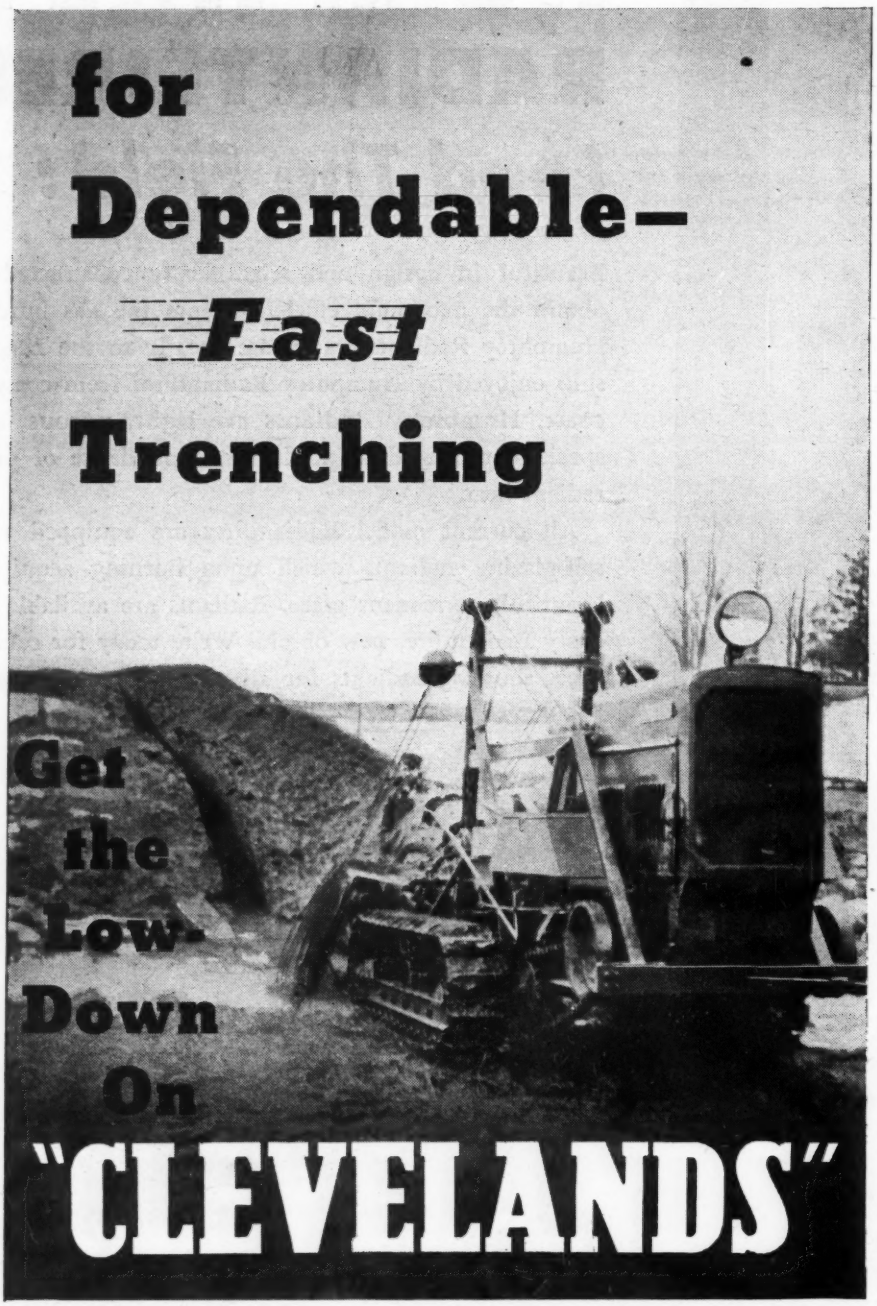
panded both as to physical property and activities. Projects in domestic research include development of methods to provide clean, cool and odorless kitchens, research on water heating, direct and central space heating, cooking appliances, as well as new designs for gas burners. In the industrial and commercial field, more efficient and economical methods of application of heat to commercial cooking and baking equipment are being explored. Methods of utilization of gas in heating and drying processes will be stepped up through use of recent scientific developments.

Research work is not being confined to the Association's Laboratories. Technical research on production, transmission and distribution of gas is also being carried out at the Institute of Gas Technology in Chicago and with other research organizations.

A.G.A. Midwest Personnel Conference Held

The latest A.G.A. Midwest Personnel Conference was held at the Phillips Hotel, Kansas City, Mo., June 7th, according to an announcement by Chairman, R. B. Harkins, personnel director, Panhandle Eastern Pipe Line Co.

Current industrial relation developments were discussed and in addition, Oakah L. Jones outlined the job description and evaluation work being done by the Oklahoma Natural Gas Co.



THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO
"CLEVELANDS" Save More . . . Because They Do More

Membership of Promotion Committee Announced

Membership of the Promotion Committee to direct sales promotion activities under the Association's expanded program of research, advertising and general promotion was announced May 31 by A.G.A. President J. French Robinson.

D. A. Hulcy, president of the Lone Star Gas Co., Dallas, Texas, whose appointment as chairman of the committee was announced last month, will be assisted by the following members at large: Joseph N. Greene, president, Alabama Gas Co., W. M. Jacobs, general sales manager, Southern California Gas Co.; Dean H. Mitchell, president, Northern Indiana Public Service Co.; Irving K. Peck, president, Binghamton Gas Works; Col. Hudson W. Reed, president Philadelphia Gas Works Co.; R. J. Rutherford, vice president, Worcester Gas Light Co.; F. C. Smith, president, Houston Natural Gas Corp.; Henry P. J. Steinmetz, vice president in charge of sales, Public Service Elec. & Gas Co.; Everett J. Boothby, chairman, manufactured gas department, Washington Gas Light Co.; P. T. Dashiell, chairman, Gas Production Research Committee, Philadelphia Gas Works; R. H. Hargrove, chairman, Natural Gas Department, United Gas Pipe Line Co.; Edward P. Noppel, chairman, Coordinating Committee on Research, Ebasco Service, Inc.; Charles A. Tattersall, chairman, Publicity Committee, Niagara Hudson Power Corp.; John H. Warden, chairman, Residential Gas Section, Oklahoma Natural Gas Co.; H. Carl Wolf, chairman, Committee on National Advertising, Atlanta Gas Light Co.; Harry K. Wrench, chairman, Industrial & Commercial Gas Section, Minneapolis Gas Light Co.

West Virginia Joins Oil Compact Commission

Announcement that West Virginia has now joined the Interstate Oil Compact Commission, made May 27 by Governor Andrew F. Schoeppel, of Kansas, Chairman of the Commission, adds the 15th member state to the Compact. Montana joined the commission on May 5.

The compact's membership now represents states which have over 80 per cent of total daily production of oil and gas in the United States.

Safety Award Extended

Upon recommendation of the Accident Prevention Committee, the American Gas Association recently approved new regulations extending the effectiveness of the safety merit award for safe operations in the gas industry. The awards, previously limited to member gas companies with 100 or more employees working one million consecutive man hours without a disabling injury accident, has been extended to include companies having less than 100 employees working 500,000 hours.

Gild Holds Eighth Dinner

The eighth birthday gathering of the Gild of Ancient Supplers was held at the Meridian Club in Philadelphia on May 15, with more than 20 Supplers from the immediate area attending.

C. Edwin Bartlett, Bartlett & Co., Philadelphia, mayor of the Gild, reviewed the Gild's progress since its inception.

Bryant Heater Opens New Testing Laboratory

A well equipped 1500 sq. ft. laboratory in Mentor, Ohio, for the testing of appliances under conditions of manufactured gas consumption is the latest addition to the research facilities of the Bryant Heater Co., Cleveland. In contrast to Cleveland's natural gas, Mentor is supplied with coke oven gas of 530 btu with a specific gravity of approximately 0.4. This type of gas corresponds to that specified for tests by the A. G. A. Testing Laboratories.

All new product development at the Bryant Heater Co. will be thoroughly tested on both natural and manufactured gas with the aid of these new facilities, as will Bryant furnaces, unit heaters and boilers. The Mentor laboratory will also be used for conversion burner testing on solid fuel burning equipment, and for the adaptation of Bryant's new automatic safety pilot to single point flash tube ignition for gas ranges, according to W. R. Teller, director of engineering and development for Bryant.

Equipment includes benches for control testing and a high temperature oven. In addition to necessary tools and pressure gauges, the laboratory also provides four wet test meters, two potentiometers, two slope gauges, a sound level meter and a calorimeter. The new laboratory will have no permanent staff, but will be in constant use by Bryant engineers and development men in search of complete performance data.

WPB Eases Restrictions On Home Building

The Federal Housing Administration last month announced its "H-2" program for the privately financed construction of new houses, for rental, sale or owner-occupancy. Priorities for home construction will be granted at 30-day intervals over a period of six months. Application should be made to FHA on form WPB 2896.

Restrictions upon this type of construction are: (1) A maximum sales price of $7000, based upon a three bedroom unit. (2) Other size units to have a maximum sales price in relation to the accommodations proposed.

Occupancy of H-2 housing is not restricted to immigrant war workers or hardship cases, but is available without eligibility limitations. However, preference will be given to those who propose owner-occupancy construction rather than to speculative builders.

The allowable amount of lumber for a three bedroom wood frame house is 6500 bd. ft., which provides for a dwelling of about 1150 sq. ft. of floor area.

Oil and Gas Industries Form Joint Policy Committee

A steering committee composed of representatives of both the petroleum and natural gas industries last month began the task of working out a combined oil and gas program for national policy.

The new combined committee includes William R. Boyd, president of the American Petroleum Institute; Russel Brown, general counsel of the Independent Petroleum Association of America; J. C. Hunter, president of the Mid-Continent Oil & Gas Association; E. Buddrus, president of the Natural Gas Association, and J. French Robinson, president of the American Gas Association.

The steering committee will direct its deliberations to some of the matters to be covered during the hearings of the Special Senate Committee investigating petroleum resources, which began about May 1. These include: New domestic petroleum sources, status of the independent company, United States petroleum requirements, American petroleum interests abroad and postwar disposal of pipe lines, refineries and tankers.

Oklahoma Tax Bills Killed

Several bills which if passed, would have placed serious restrictions on the natural gas industry, were introduced in the Oklahoma Legislature.

Following a number of public hearings before committees of the Legislature, all were killed.

One bill would have placed a tax of 2¢ per Mcf. on gas at the well. Another proposed a 2¢ levy on all gas produced except that used for injection in, "lifting, storing, recycling or re-pressuring, or gas used as fuel in operating leases or in manufacture of carbon black. Another measure proposed a tax of 1¢ per gal. on all gasoline produced at the refinery.

● Non-metallic Transite Flue Pipe not only is rustproof, it is light in weight . . . easy to install and support . . . can be cut to fit on the job. Neat and attractive in appearance, it needs no painting. 2" to 12" sizes; round and oval. Complete line of fittings and accessories.

For details, write for booklet TR-13A. Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville **TRANSITE FLUE PIPE** For venting gas-burning appliances

PEOPLE

• **A. H. Weyland,** general superintendent of the Arkansas Natural Companies since 1933, was elected to the office of vice president and general manager, and director, of the Arkansas Louisiana Gas Co., Arkansas Natural Gas Corp., Arkansas Fuel Oil Co., and Arkansas Pipeline Corp., on May 17 at a meeting of the board in New York City, the home office at Shreveport, La. announced.

A. H. Weyland

The resignation of **D. W. Harris,** former president, to accept another position was accepted. **B .R .Muirhead,** former treasurer of the company has also resigned to accept another position.

Weyland joined the Cities Service organization in 1919 and in 1933 he was made general superintendent in charge of all operations of the Arkansas Natural and all associated subsidiaries. He was elected vice president of the Arkansas Louisiana Gas Co., a subsidiary of the Arkansas Natural Gas Corp., in 1936.

H. T. Goss, chief engineer of all Arkansas Natural Companies, will assume the position formerly held by Weyland; and **M. J. Lasseigne** was named treasurer, replacing Muirhead.

• The following three new appointments have been announced by the San Diego Gas & Electric Co., San Diego, Calif.:

Clarence W. Watters, assistant general auditor, became comptroller of the company on May 31. Joining the company in 1927 as a traveling auditor, Watters was promoted to chief clerk in 1933 and became general auditor in 1941.

J. M. Bourus, general auditor, became treasurer on May 31. He entered the employ of the San Diego utility in 1918 as clerk in the accounting department, became assistant auditor in 1924 and general auditor in 1934.

Ray C. Cavell became the company's new secretary on June 1. He was employed by the company in 1910 as a draftsman, becoming head of the record department (now the engineering department) in 1915.

The company also announced the retirement of **Morton B. Fowler,** vice president and treasurer. His retirement brings to an end 41 years of service with San Diego Gas & Electric.

• **Harland C. Forbes** was elected vice-president of Consolidated Edison Co. of New York, Inc., in charge of development and planning, at the organization meeting of the company's Board of Trustees, May 22. Other officers were re-elected. Forbes succeeds **John C. Parker,** who having passed the Company's retirement age, was retained as a consultant for special assignments from the president.

H. C. Forbes

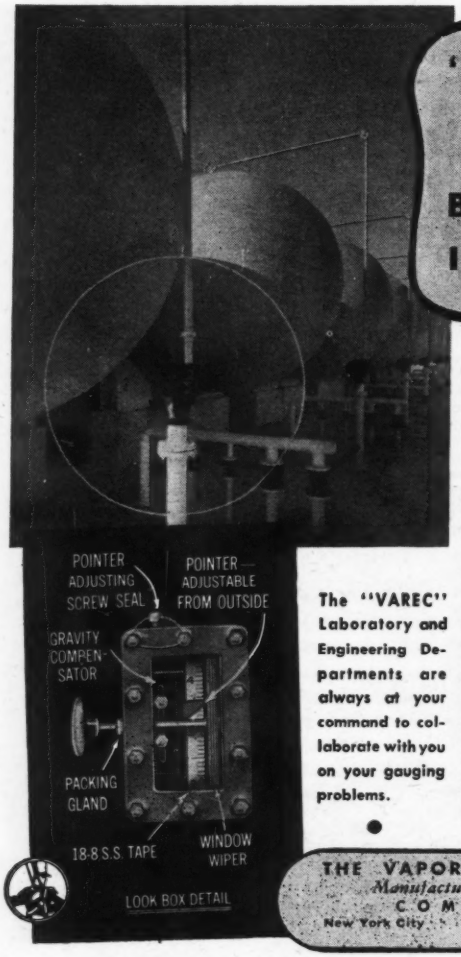
Mr. Forbes has been assistant vice-president of the Company since 1940. After receiving a Master's degree at Massachusetts Institute of Technology in 1923, he served two years as an instructor at M. I. T., spent one year with Western Electric Company, and joined the New York Edison Company in 1924. He became research engineer of the Co. in 1928 and system engineer in 1932.

• **John A. Ferguson,** executive director of the Independent Natural Gas Association of America, Oklahoma City, has announced the appointment of **Louis E. Whyte,** of Washington, as supervisor of the Educational Department of the Association.

Whyte left the staff of the Bureau of National Affairs, an affiliate of the United States News organization, to accept the INGAA position. His work will include the handling of news releases, collection and dissemination of material of interest to Association members and conducting a program designed to educate the public generally as to the problems of the industry.

• **R. G. Rincliffe** has been elected vice president in charge of electric operations of the Philadelphia Co., according to a recent announcement by **H. P. Liversidge,** president of the company. Rincliffe joined Philadelphia Electric as an engineering assistant in 1923. Following a succession of various assignments, he was named superintendent of gas production in 1927 and was made superintendent of gas manufacturing for the entire company four years later. At the time of his election as vice president he was manager of electric station operations.

• **Eskil I. Bjork,** vice president in charge of budget, purchasing and stores of the Peoples Gas Light and Coke Co., Chicago, has been assigned additional duties in the company by Chairman **George A. Ranney,** following the resignation of **J. A. Cunningham.** Bjork will now have charge of the personnel department, the claim department, and the Peoples Gas Building, in addition to maintaining his former supervision over the budget and purchasing departments.



"VAREC" HAS *definitely* BUILT ACCURACY INTO TANK GAUGES

ACCURACY and DEPENDABILITY characterize the extensive line of "VAREC" Gastight Automatic Tank Gauges designed to fit any shape of tank and for operating pressures from 0 to 300 pounds per square inch. Outstanding basic features are the look-box which may be read from near ground level or from top of the tank, aluminum tape sheaves mounted on stainless steel ball bearings, floats made in several designs and of a large number of different materials, and simplicity of installation and operation. Tape, guide wires, and counterweight cable are made of 18-8 stainless steel as standard. "VAREC" Look-boxes are equipped with adjustable Indicator, Gravity Compensator, and Window Wiper. The latter feature assures easy reading of the tape without having to open the gauging system to atmospheric pressure. An exclusive feature is the Gravity Compensator which is furnished with the Look-box and on the Float in most of the Gauges. The Gravity Compensator, a patented "VAREC" feature, enables the gauge user to read direct on the tape for any gravity of liquid without having to resort to gravity conversions. The standard Float is heavy aluminum plate, two halves gas-welded together, and tested for pressures up to 3 ounces per square inch. The self-bailing float is standard for operating pressures over 3 ounces and up to 20 pounds. The reinforced float is recommended for pressures over 20 pounds per square inch.

The "VAREC" Laboratory and Engineering Departments are always at your command to collaborate with you on your gauging problems.

The Pace Setter Since 1928

THE VAPOR RECOVERY SYSTEMS COMPANY
Manufacturers of Gas Control and Tank Equipment
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IN 1909 THE FIRST WARD FLOOR FURNACE WAS DESIGNED . . .

BLERIOT'S feat in spanning the channel marked a milestone in aviation. It was the forerunner of today's flights across the ocean.

Like Bleriot, Ward pioneered a new field 36 years ago. Ever since then, Ward Floor Furnaces have provided convenient, healthful heat to the nation's homes.

And, like the airplane, Ward Floor Furnaces have seen many an improvement: *Built-in Thermo Control; Cradle Circulation; Sealed, Vented Combustion* . . . all features that assure convenient, efficient operation.

The Ward you will sell tomorrow will offer still greater advantages—selling features which you will want to investigate now.

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WARD HEATER COMPANY

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E. L. Hall

• **Edwin L. Hall** has been appointed secretary - coordinator of the Gas Production Research Committee of the American Gas Association effective May 15, **J. French Robinson,** president of the Association, announced. Hall resigned as manager and treasurer of the Manchester Gas Co., Manchester, N. H., to join the A.G.A. staff. His successor at Manchester is **Edward Niederer, Jr.,** formerly of the Bridgeport Gas Light Co., Bridgeport, Conn.

As secretary-coordinator of the committee headed by **P. T. Dashiell** of Philadelphia, Hall will supervise gas production research activities of institutions and plants where projects sponsored by the committee are undertaken.

• **Porter C. Savage,** assistant vice president for design, inventory purchasing and stores, of the Consolidated Edison Co., New York, retired May 1 after 32 years with the company. Savage was named head of Consolidated Edison's purchasing department in 1936 and was elected an assistant vice president in 1940. During the spring of 1942 to the fall of 1943 he spent much of his time in Washington, D. C. as a coal consultant. He was appointed last summer by **Harold L. Ickes,** as a member of the Solid Fuels Advisory War Council.

• **Vincent T. Miles** has recently been elected treasurer of the Long Island Lighting Co., the Queens Borough Gas and Electric Co., Nassau & Suffolk Lighting Co., and the Long Beach Gas Co. He succeeds **Edward F. Barrett,** president of the Long Island Lighting Systems, who also held the position of treasurer of these companies following **Robert G. Olmsted's** resignation to enter the army.

Miles has had a long career in the Long Island System and for the past several years has been assistant treasurer of these companies.

• **Hudson W. Reed,** president of the Philadelphia Gas Works Co., recently announced that two members of his staff have been elected vice presidents of the company.

H. B. Andersen

H. Bruce Andersen, who has charge of the distribution system of the company, was elected vice president in charge of distribution. Andersen entered the company's employ in 1906 as street clerk and has been with them since.

Thomas S. Lever, Jr. was elected vice president in charge of accounting. Lever entered the employ of the United Gas Improvement Co., then operating the city's gas works, as a junior clerk in 1903. In 1933 he was appointed comptroller of Philadelphia Gas Works Co.

• **L. B. Denning, Jr.,** operating manager for Lone Star Gas Co.'s general division of distribution, Dallas, has announced that **Homer V. Smith** has been appointed manager of the Cleburne distribution district, succeeding the late **P. E. Warren.** Smith has been manager of the Taylor distribution district for several years. **Ross L. Dixon,** manager of the Athens district, will succeed Smith at Taylor. Dixon's successor at Athens will be named in the near future.

• **Mrs. Fleta H. Matson** has been appointed home service director of the Binghamton Gas Works, Binghamton, N. Y., succeeding **Mrs. Helen Heiser.** Mrs. Matson was formerly affiliated with the Adirondack Power and Light Co., Schenectady, and held the post of emergency assistant home demonstration agent of the Broom County Nutrition Program.

• **J. M. Lynn, Jr.** has been appointed to succeed **C. K. Patton** (resigned) as new business manager of Lone Star Gas Co.'s Dallas division of distribution, according to an announcement by **Wesley F. Wright,** general manager of the company's Dallas division of distribution.

6,500 MILES OF GAS MAINS

have been treated with CARBOSEAL Anti-leak

Experience on 6,500 miles of gas mains has shown that treatment with Carboseal Anti-Leak is one of the quickest methods of checking gas leakage. This method saves *labor, gas, money* and *materials;* and the job can be done without tearing up streets or shutting off service.

Leakage reduction of 90 to 100 per cent is usual. Actual tests on joints 11 years after treatment with Carboseal Anti-Leak show that the joints remain tight.

A booklet, "Correcting Leakage in Gas Distribution Systems with Carboseal Anti-Leak," tells more about this treatment—how to apply it, how much it costs, what results can be obtained. Write for a copy.

CARBIDE AND CARBON CHEMICALS CORPORATION

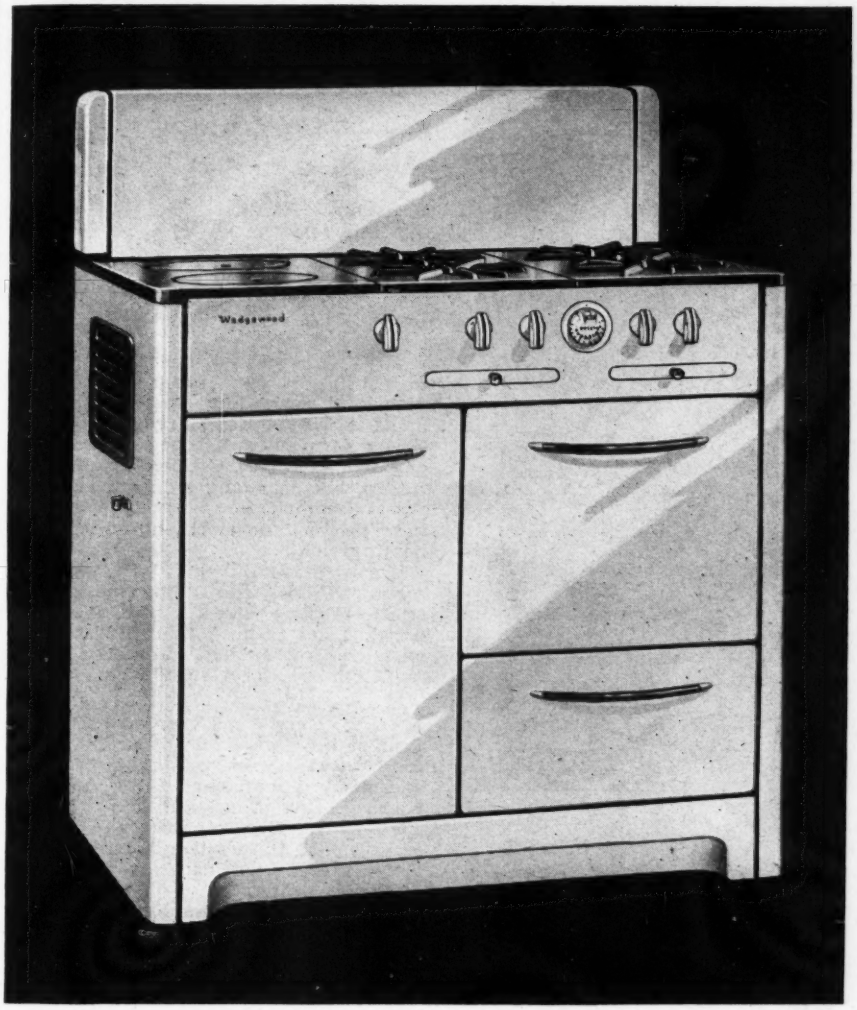
Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

"Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

CARBOSEAL *Anti-leak*

"Makes me a BETTER cook!"



WEDGEWOOD'S BETTER BAKING OVEN

simplifies the problem of the MODERN HOMEMAKER

● **Wedgewood's** superior design has produced a definitely better baking oven, recognized by Western homemakers for 62 years as their finest friend. That is why **Wedgewood** Gas ranges lead in reputation. They have the acceptance, the "quality appeal".

SINCE 1882, Western women have looked to **Wedgewood** for real aid in their baking problems, which explains why James Graham Mfg. Co. spares neither pains nor expense to constantly improve their product. The post-war **Wedgewood** will continue that tradition.

MODERNS PREFER GAS

FOR ALL GASES, INCLUDING LP (LIQUEFIED PETROLEUM) GAS

WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

Manufacturers

• The retirement of **Robert K. Clark,** manager of the George M. Clark and Co. Division of the American Stove Co., Harvey, Ill., has been announced. Clark, who became manager of the George M. Clark Division in 1922 was also a director, vice president and a member of the executive committee of American Stove. He will continue as a director.

Harold B. Isaac, who succeeds Clark as manager, joined the engineering department of the company in 1927. He became assistant foreman, then foreman of the press room, and from 1940 to the time of his present appointment he served as general superintendent.

• The appointment of **Lucien W. Moore** as general manager of sales and branch houses of the Crane Co., Chicago, has been announced. Moore succeeds **J. A. Dwyer,** recently elected vice president in charge of sales and branch houses. **F. J. Wilkey,** district manager, Chicago, was appointed manager of the valve and fitting department, the position held by Moore until his recent assignment in France by the War Department.

Moore had served the Crane subsidiary in France as manager of sales, and after his return to the United States in 1940 he was successively manager of pipe sales and general purchasing agent, before his appointment as manager of the valve and fitting department.

• **C. K. Patton** has resigned the position of new business manager of Lone Star Gas Co.'s Dallas division of distribution, to accept a position as southern manager of the Ward Heater Co., with offices in the Santa Fe Bldg., Dallas.

C. K. Patton

Patton became associated with Lone Star as new business manager of the old Texas Cities Gas Co. in 1929 and was later appointed new business manager of the Dallas Gas Co., both subsidiaries of Lone Star at that time.

• **R. C. Gregg** has joined the engineering staff of the Bryant Heater Co., Cleveland, according to an announcement by **Lyle C. Harvey,** president. Gregg, formerly assistant chief research engineer of the A. G. A. testing laboratories, will be engaged in fundamental research work for Bryant, leading to new product development in the gas heating field.

Harvey also announced the appointment of **N. Charlton Gilbert** as industrial relations director for the company. Prior to his joining Bryant, Gilbert was personnel director for the A. C. Gilbert Co., New Haven.

• **D. W. Harris** has been named president of the Universal Oil Products Co., following his resignation as president and general manager of the Arkansas Natural Gas Corp. Harris succeeds **Thomas W. Bowers,** who was serving as president and chairman of the board. He will continue as board chairman of the company.

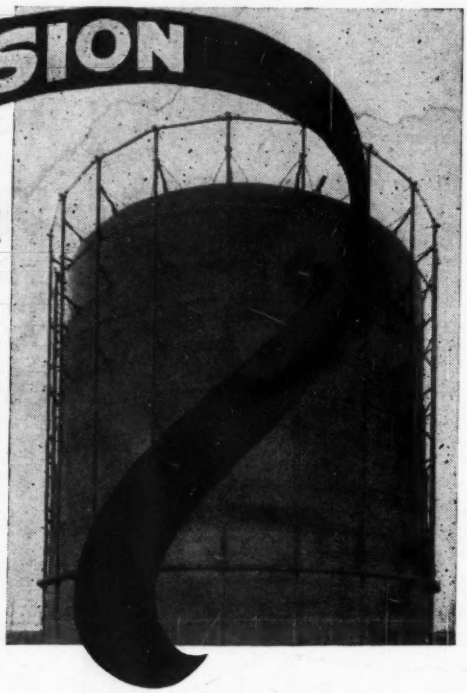
Harris, an active member of the gas industry, is a vice president and a director of the Mid-Continent Oil and Gas Association, a director of the American Gas Association and a counsellor of the American Petroleum Institute.

• **Lewis M. Horvath** has been appointed divisional sales manager, HI-G Division for General Controls Co., Glendale, Calif., according to an announcement by **E. T. Howard,** general sales manager of the firm. Prior to joining General Controls, Horvath spent several years with Adel Precision Products Corp., Burbank, Calif.

• The appointment of **V. J. Evans** as sales engineer for the Wilcolator Co., Elizabeth, N. J., has been announced by **H. A. Wilson,** president of the company. Evans has been associated with the gas and electric appliance industry for about 20 years and has also spent several years in the liquefied petroleum gas industry on various field service problems.

• **Leslie A. Baldwin,** vice president of Johns-Manville Sales Corp., was honored by his business associates at a

Is CORROSION Getting the better of your GAS HOLDERS

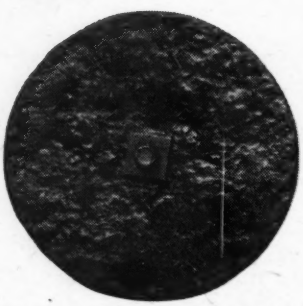


Are you sure of the condition on the INTERIOR of your gas holders—where corrosion usually does the most damage?

When you avail yourself of the Stacey Brothers Inspection Service, you not only definitely know the inside condition of your holders, but you are also given definite recommendations for combating further progress of corrosion that has already developed. Our recommendations also cover an estimate of the cost to repair damaged parts of your holder. Stacey Brothers Inspection Service can be relied on because it is based upon many years of experience in the design, manufacture, erection, and maintenance of the majority of gas holders located in the United States.

Stacey Brothers Inspection Service is the best "insurance" you can have against the dangers and expense of corrosion, shutdowns, and "accidents." Write for Bulletin I-44.

The STACEY BROS. GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 Vine St., Cincinnati 16, Ohio

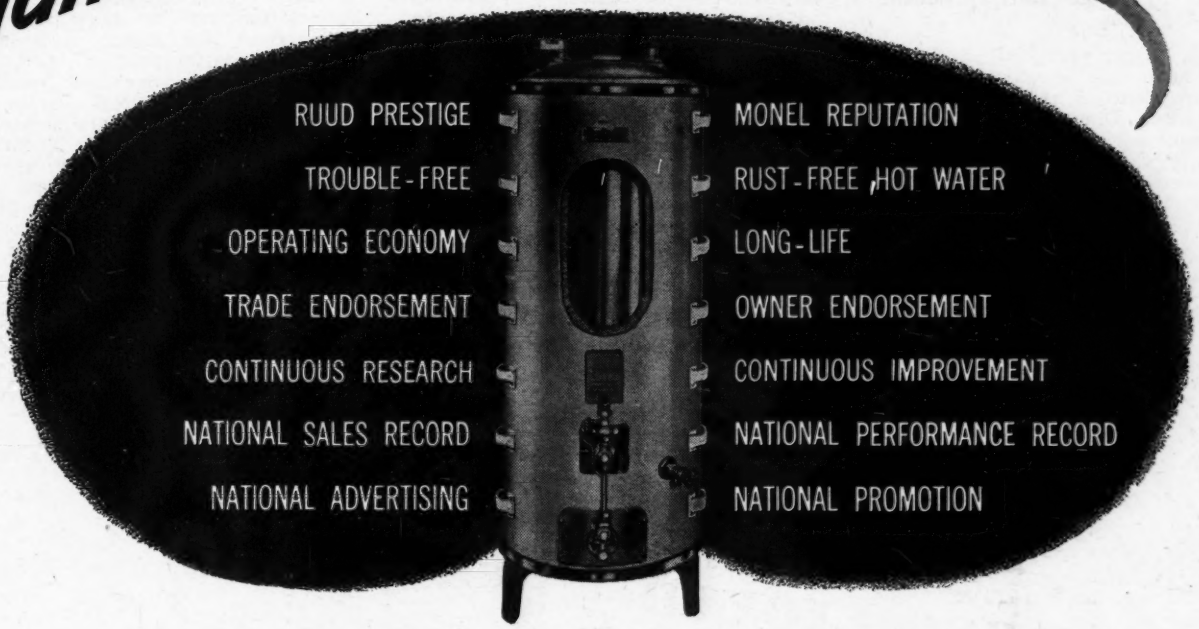


Shown above is photo of an actual coupon taken from gas holder. Note the presence of deep corrosion. Stacey Brothers Inspectors thoroughly coupon each holder at all points that are vulnerable to corrosion.

GAS HOLDER
INSPECTION SERVICE

Stacey Brothers
ENGINEERS • FABRICATORS
ERECTORS • RECOGNIZED
EXPERIENCE & FACILITIES

Handles... that help you HOLD THE LOAD!



H_2OT STUFF

★ **If you were selling** water heaters in Iceland, you'd compete with volcanic springs which furnish 24-hour-a-day hot water service rivaling that supplied by Ruud-Monel.

2700 homes in Reykjavik, for example, are connected by insulated pipeline with wells 10 miles away. Hot water comes out of the ground at 170° F., and reaches the homes with only a nine-degree heat loss.

★ **The first-prize winner** in a contest sponsored by the Michigan Consolidated Gas Company (Grand Rapids) named 870 different uses for hot water.

As she accepted her Ruud Automatic Gas Water Heater prize, she modestly remarked, "I could add even more."

★ **According to the 1940 Census,** 56.2% of all homes in the United States have either a bathtub or a shower.

★ **One customer** can still get Monel tanks—the U. S. Navy.

Used to hold distilled water for submarine storage batteries, Monel tanks assure high purity... and absolute freedom from rust.

A water heater with *handles?*

Yes... because handles help you *sell.*

And because they keep customers *sold.*

Ruud Automatic Gas Water Heaters with Monel Tanks always had *strong* handles. Before the war, the Ruud-Monel combination was solidly established... had been enthusiastically accepted by utility, dealer and customer.

When battle clouds roll away, Ruud Automatic Gas Water Heaters—with tanks of rustfree, corrosion-resistant Monel—will be back. And, as a result of tireless research carried on by Ruud in cooperation with The International Nickel Company, you'll find improvements in appearance, construction and operation.

WE PREDICT: Ruud-Monel Water Heaters will play an important role in helping *GAS,* the Wonder Flame, win... *and hold*... a tremendous peacetime load.

Your customers will have an abundance of crystal-clear hot water... 24 hours a day... at any desired temperature. That's the kind of service they *expect*... and the kind you *want* them to have.

RUUD MANUFACTURING COMPANY, PITTSBURGH 1, PA.

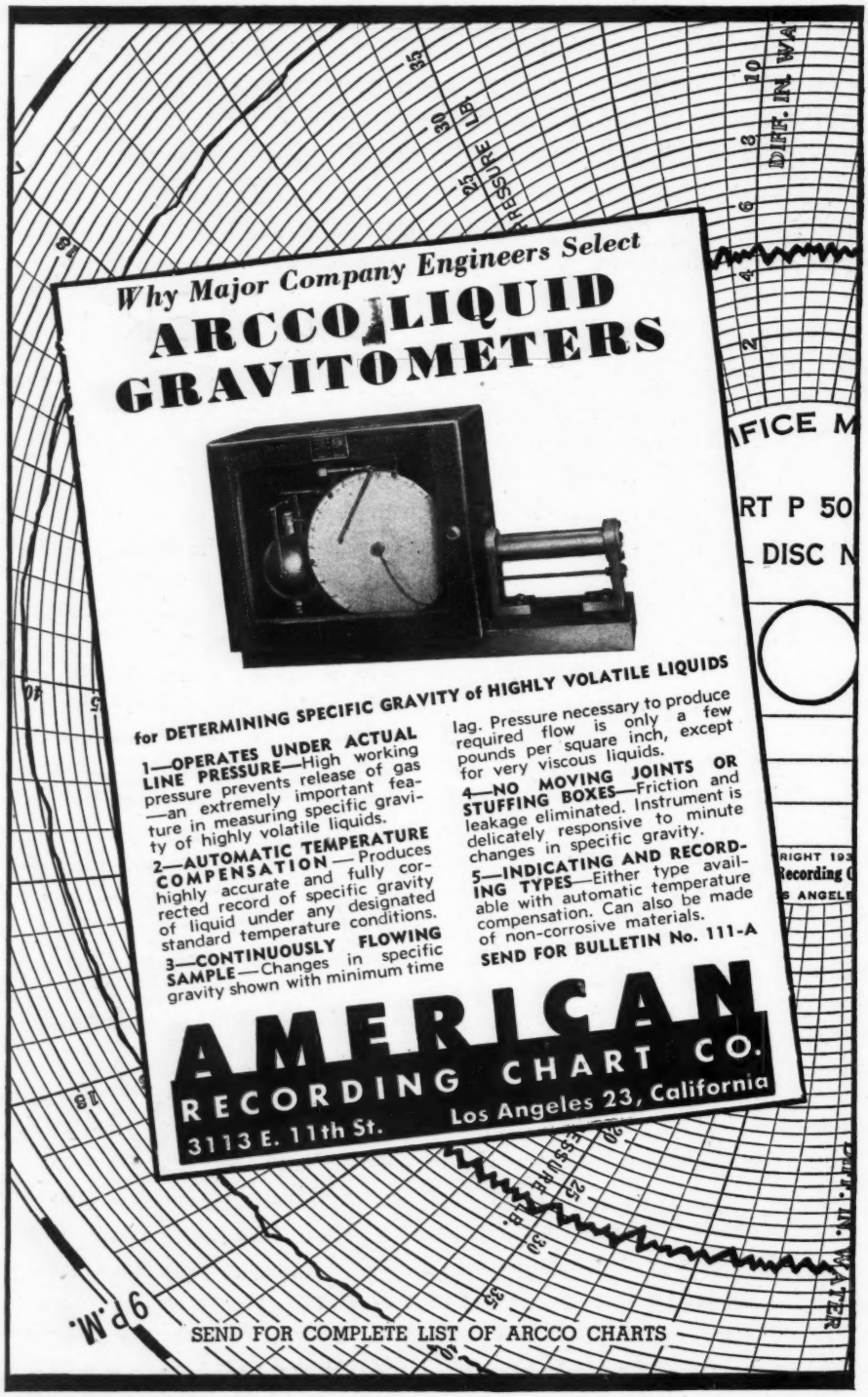
RUUD GAS MONEL ... perfect partners for *Automatic Hot Water Service*

luncheon held at the Hotel Commodore, New York City, on May 8th, marking the completion of his 25th year with the company. Following the luncheon, he was inducted into the Quarter Century Club, honorary organization of those with 25 or more years of company service, by **L. R. Hoff,** president of Johns-Manville.

• **C. A. Olsen,** president of the C. A. Olsen Mfg. Co., of Elyria, Ohio, and also president of the Henry Furnace Co., Medina, Ohio; and **Bruce T. Cunningham,** sales executive of Research Products Corp., Madison, Wis., have been elected directors of the Indoor Climate Institute, to fill two vacancies on the governing board.

• **Harry D. Wagner** has been added to the Foxboro Co.'s staff of engineers serving the Cleveland area. He has already taken up his new duties, with headquarters in Cleveland. Wagner has had extensive practical training in industrial instrumentation, having supervised the installation and operation of instruments in numerous plants.

• **Dean D. Ault** has joined the Westcott & Greis division of the American Meter Co., as field engineer, with headquarters in Houston. His background of experience includes work on recording instruments and automatic control applications in the gas and petroleum industries and remote automatic control and loading of gas regulators.


Why Major Company Engineers Select
ARCCO LIQUID GRAVITOMETERS
for DETERMINING SPECIFIC GRAVITY of HIGHLY VOLATILE LIQUIDS
1—OPERATES UNDER ACTUAL LINE PRESSURE—High working pressure prevents release of gas—an extremely important feature in measuring specific gravity of highly volatile liquids.
2—AUTOMATIC TEMPERATURE COMPENSATION—Produces highly accurate and fully corrected record of specific gravity of liquid under any designated standard temperature conditions.
3—CONTINUOUSLY FLOWING SAMPLE—Changes in specific gravity shown with minimum time lag. Pressure necessary to produce required flow is only a few pounds per square inch, except for very viscous liquids.
4—NO MOVING JOINTS OR STUFFING BOXES—Friction and leakage eliminated. Instrument is delicately responsive to minute changes in specific gravity.
5—INDICATING AND RECORDING TYPES—Either type available with automatic temperature compensation. Can also be made of non-corrosive materials.
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Obituaries

• **Miss Mary Spear,** in charge of membership records for the American Gas Association until a short time before she retired last March, died in New Jersey the latter part of April, at the age of 66. Miss Spear, a veteran of natural gas association service, completed more than 25 years' service with the A.G.A. and the former Natural Gas Association of America. In recent years, she was proof reader for the A.G.A. Monthly and other Association publications and also assisted in the work of the Natural Gas Department.

• **Henry O. Loebell,** former vice president and general manager of the Combustion Utilities Corp., and prominent executive, technologist and consultant in the gas, petroleum and electric industries, died May 3 at the age of 59.

Active in the American Gas Association, Loebell won the Charles A. Munroe award for distinguished service and outstanding contributions to the gas industry in 1934.

• **Edmund W. Wakelee,** president of Public Service Corp. of New Jersey and subsidiary companies, passed away the latter part of April, just 10 days after his retirement had been announced. Wakelee has been associated with Public Service and predecessor companies since 1900. He had been an officer of the company for more than 25 years and its president since 1939.

• **Corwin C. Abbott,** sales manager for the gas products division of the Pittsburgh Equitable Meter Co., died suddenly in Cleveland on May 8th, while attending a meeting of the A.G.A. Research Committee. Before coming to Pittsburgh, Abbott was an engineer for the Connelly Iron Sponge and Governor Co. of Chicago.

• **Philip G. Gossler,** chairman of the board of the Columbia Gas & Electric Corp., passed away May 18 in New York after a brief illness. Gossler became manager of the corporation in 1912 and held the position of president for 25 years.

AWARDS

• An army-navy "E" award has gone to the **U. S. Bureau of Mines** helium plant at Otis, Kansas, third such plant to receive this recognition.

In the first year of its operation the plant produced, "two and a half times more helium than was produced throughout the world in any years before Pearl Harbor," the navy citation said.

Other helium plants operating in the Southwest are located at, Amarillo and Exell, Texas; Cunningham, Kan., and Shiprock, New Mexico.

Surplus helium will be stored in a natural underground cache in the Cliffside natural gas field, near Amarillo, Texas, Secretary of the Interior Ickes, has announced.

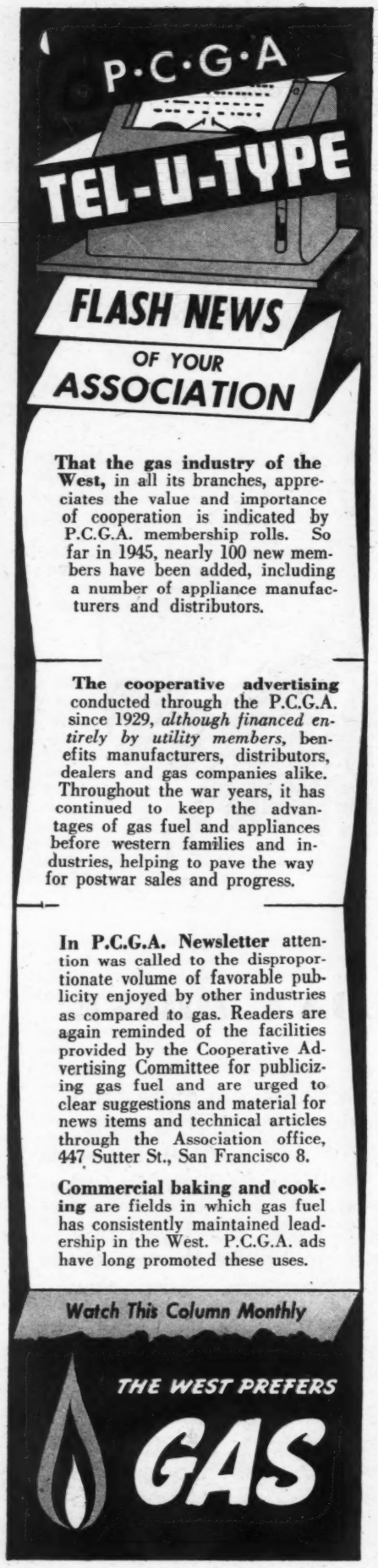
SUPPORT THE 7th WAR LOAN DRIVE

BUY BONDS. The government needs additional billions to bring the war to its speedy and ultimate conclusion—Victory and Peace for a war-weary world. Monies from our other War Loan Drives have been transplanted into glorious deeds by our armed forces. Germany has collapsed. The Jap snarls in his home lair while our military and naval might closes about him with an ever-tightening wall of steel and fire.

BUY BONDS. The bonds you buy in the 7th War Loan Drive, like your other bond purchases, are more than a mere patriotic gesture. They represent an investment of faith in the future of your country. War bonds are security for you, your family and your way of living. Every bond you buy brings a little closer the things you want in the postwar era . . . that new home . . . a little farm . . . a new car . . . the boy and girl in college . . . that long-delayed vacation trip.

BUY BONDS . . . for your country . . . for the welfare of the civilization of which you are a part . . . and, last, for the material benefit of yourself.

P. G. and E. PACIFIC GAS AND ELECTRIC COMPANY


P·C·G·A
TEL-U-TYPE
FLASH NEWS
OF YOUR
ASSOCIATION
That the gas industry of the West, in all its branches, appreciates the value and importance of cooperation is indicated by P.C.G.A. membership rolls. So far in 1945, nearly 100 new members have been added, including a number of appliance manufacturers and distributors.
The cooperative advertising conducted through the P.C.G.A. since 1929, although financed entirely by utility members, benefits manufacturers, distributors, dealers and gas companies alike. Throughout the war years, it has continued to keep the advantages of gas fuel and appliances before western families and industries, helping to pave the way for postwar sales and progress.
In P.C.G.A. Newsletter attention was called to the disproportionate volume of favorable publicity enjoyed by other industries as compared to gas. Readers are again reminded of the facilities provided by the Cooperative Advertising Committee for publicizing gas fuel and are urged to clear suggestions and material for news items and technical articles through the Association office, 447 Sutter St., San Francisco 8.
Commercial baking and cooking are fields in which gas fuel has consistently maintained leadership in the West. P.C.G.A. ads have long promoted these uses.
Watch This Column Monthly
THE WEST PREFERS
GAS

NEW PRODUCTION

• **Humble Oil & Refining Co.** is opening a new deep sand for the Avery Island field of Iberia Parish, La. Total depth is 11,405 ft., with 5½-in. casing set at 11,289 ft., perforated at 11,208-216 ft. The well flowed at the rate of 44 bbl. a day of 44.6-gravity oil with 1,217,000 cu. ft. gas, tubing pressure 2400 lb., gas oil ratio 27,425 to 1, on a drillstem test using 3/16-in. bottom and ⅛-in. top chokes, open 14 hours. Operators are preparing to squeeze perforations.

• **A Stanolind Oil & Gas Co.** well in the extreme southwest corner of Meade County, Kans., opens a new gas pool with a rating of 35,000,000 cu. ft. of gas daily from the Mississippi lime. This well has been testing for months, and the tools were carried to 7921 ft. in the Arbuckle, before plugging back to complete in the Mississippi. The location is about 16 miles east of the Hugoton gas field.

• **Union Sulphur Co.** (New Orleans, La.), has opened a new pool in the South Bayou Mallet area of Acadia Parish. On 24-hour potential gage the well flowed 146 bbl. of fluid, 10% salt water, with 1300-lb. pressure on tubing, through 7/64-in. choke. Gas-oil ratio was 1881 to 1 and gravity 36.8°. Total depth is 9798 ft. with perforations at 9610-14 ft.

• **Tide Water Associated Oil Co.** opened a new sand for the Venice field of Plaque-mines Parish, La. Total depth is 12,431 ft. in shale with 5½-in. casing set at 12,424 ft. Pipe is perforated at 11,867-98 ft. and the well is on production test, flowing 10.39 bbl. an hour through 5/31-in. choke, tubing pressure 1250 lb., gas-oil ratio 740 to 1, gravity 35°.

• **Ohio Fuel Co.,** 259 Sunday Creek Coal Co., Section 1, Monroe Township, Perry County, Ohio, indicates the opening of a new Clinton gas pool. Sand at 3983-4018 ft. gaged 757,000 cu. ft. with pay at 3988-3994 ft. The well will be tested in the lime before any offsets are drilled.

• **Four Way Oil,** 3 Albert Sturgeon, Section 23, Hopewell Township, Perry County, was shot after standing for some time, and flowed 70 bbl. with 206,000 cu. ft. gas. The company has started another well ¼ mile to the northeast.

• Among new natural gas discoveries in Mid-continent areas are: Extension of the North Horns Corner (Okla.) field east of Holdenville through a Phillips Petroleum Co., well which tested 10,000,000 cu. ft. per day; Tide Water Associated and Skelly Oil Co., in the Erick Gas field of Beckham County, Okla.; a 4,995,000 ft. per day well by Stanolind Oil and Gas Co., in the Aylesworth oil field of Oklahoma; production of 20,000,000 cu. ft. per day in a new gas field near Harleton, Texas; extension three miles southward of the Pacific lime gas area of Panola County, Texas, by a Sun Oil Company well gauging 55,000,000 cu. ft. of wet gas daily and a 30,000,000 cu. ft. gasser of the Lion Oil and Refining Co., southeast of the Schriver oil pool of Barber County, Kansas.

• In the new development in southern West Virginia, **United Producing Co.** completed a gas well in the Center district, Wyoming County, at 1189 W. M. Ritter Lumber Co., which had natural open flow of 1,000,000 cu. ft. of gas, and 2,970,000 cu. ft. after being acidized.

PIPELINE NEWS

• The Federal Power Commission has postponed until June 15 the hearing previously set for May 23 on the **Central Illinois Public Service Co.'s** amended petition, filed with FPC on May 3, in which the company asked for authority to construct its own facilities connecting its pipelines with those of **Panhandle Eastern Pipe Line Co.** near Mattoon, Ill., in case the FPC does not find sufficient evidence to warrant ordering the Panhandle company to construct similar facilities as the Illinois company originally requested.

Also postponed until June 15, is the **Kentucky Natural Gas Corp.'s** application for authority to construct and operate about 20 miles of 6-in. pipeline extending from a connection with Central Illinois' distribution system. The Kentucky corporation stated in its application that the facilities were needed in order to supply Central Illinois with additional gas.

• Zenith Gas System, Inc., of Woodward, Okla., plans to expend $40,000 in 1945 in improving its system, Lewis Robertson, vice president, announces. The company supplies Woodward, Cherokee, Waynoka, Alva and nearby points in Kansas with natural gas.

Included in this year's improvements will be replacement of six miles of 6-in. line, eight miles north of Alva. The company has gas wells on the Davis ranch near Etna, Kan., and a producing field in Barber County, Kan.

• The Federal Power Commission, at the request of the Railroad Commission of Texas, has postponed until June 20 the hearing on the application of **Panhandle Eastern Pipe Line Co.** for authority to export gas from the United States to Canada and for constructing facilities for handling gas for export in connection with its Texas-Detroit system.

Engineering Activities Consolidated into One Bureau

The Federal Power Commission, in the interests of economy and efficiency, has consolidated its engineering activities in a single bureau known as the Bureau of Power with headquarters in Washington, D. C. and field offices at New York, Atlanta, Fort Worth, San Francisco and Chicago. Those engineering activities formerly handled from Baltimore are being transferred to Atlanta, New York and Chicago. The Chief of the Bureau is E. Robert de Luccia, former Lieutenant Colonel, Corps of Engineers.

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REYNOLDS Builds a Regulator for every type of Gas Control Installation. Proved by records of performance in actual operation, or by records of factory tests on new developments, every REYNOLDS unit—whether for high pressure or low—is a proved product.

Long life, efficient operation, accurate regulation, reasonable cost, low upkeep—these are the vitally important inherent features built into REYNOLDS Gas Regulators through more than 50 years of experience in developing, designing, building and testing Gas Control equipment.

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- High Pressure Service House Regulators: Straight Lever Type—Models 10-20 Series. Toggle Lever Type—Model 30 Series
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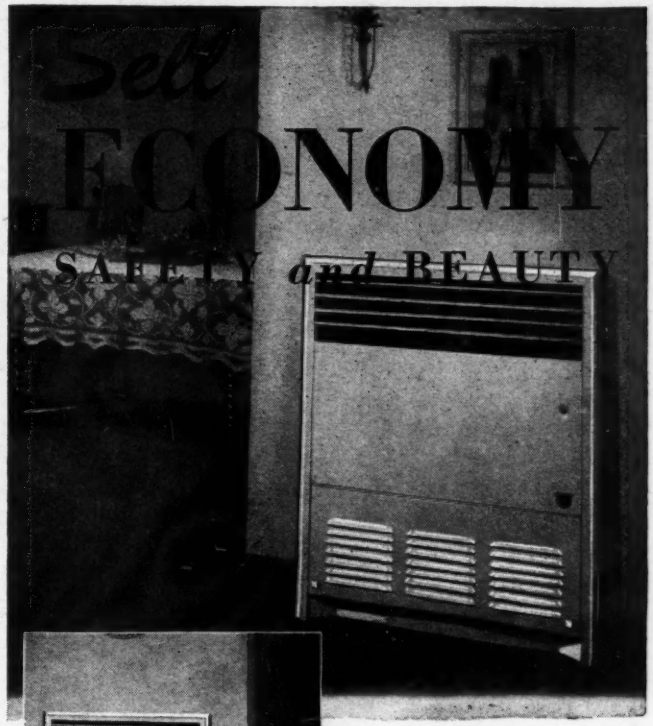
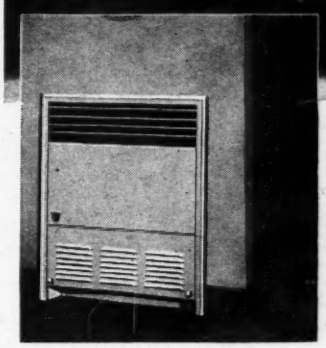
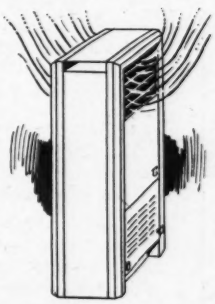




Sell HAMMEL DUAL WALL HEATERS . . .

Sell THE NEWEST IN GAS-FIRED VENTED HEATERS

The Hammel Dual Wall Heater has a large heating unit which completely encloses the flame and by radiation heats the circulating air.



HOME OWNERS and prospective buyers of homes are going to demand increased comfort and convenience when they purchase new home appliances and equipment after the war. They'll not expect "dream marvels" but they will definitely demand greater economy in cost and operation.

To cater to these demands, you'll want to know about the new vented Hammel Dual Wall Heater. It is made for installation in the wall between rooms; provides comfortable heat throughout the home.

You'll want to know all the features and sales making advantages; the many reasons why its new design and greater efficiency guarantee its economy of operation. Made in 3 capacities for 4-, 8- and 16-inch wall thickness; it's attractive, efficient and economical.

Write for illustrated catalog.

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ENGINEERING
and
MANAGEMENT
CORPORATION

All phases of
GAS and ELECTRIC
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MANAGEMENT
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For Bottle Tight Joints Under High Gas or Liquid Pressure, Use DOUBLEX SIMPLEX MONO-CAST PIPE

The Doublex Simplex Joint on Mono-Cast Pipe makes a bottle tight joint under operating pressures in excess of 500 pounds gas and 1,000 pounds liquid. Mono-Cast centrifugal Pipe with Doublex Simplex Joints with plain rubber gasket and lead ring packing are desirable for conveying gas, oil, gasoline, water, sewage and other fluids where the temperature does not exceed 175° F. For higher temperature service, asbestos gaskets are available. This joint allows for liberal deflection and longitudinal expansion and contraction in the line without danger of leakage.

AMERICAN CAST IRON PIPE COMPANY
Birmingham 2, Alabama
Sales Offices in Principal Cities

NEW PRODUCTS

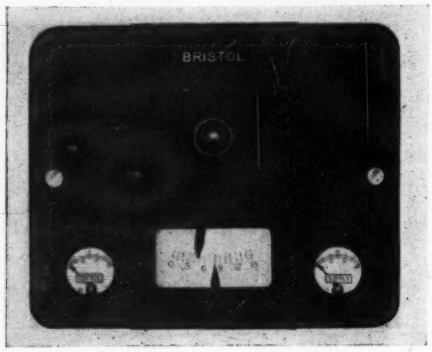
Air-Operated Controller

The Bristol Co., Waterbury 91, Conn.

Model: Model 93, Air-Operated Controller.

Application: The control of temperatures in bake ovens, drying ovens, cookers, retorts, planting tanks, and soft metal pots and the control of steam pressure, pressure in retorts, and back pressure of digesters.

Description: Model 93 controllers operate on the free-vane principle of automatic control. They have a throttling



range of from ½ to 15% with the adjusting mechanism arranged so that changes in the throttling range can be made by the user without the need of tools. These controllers are direct set instruments that can be set to control at any value within the range of the instrument by turning the control pointer to the desired value. They are built so that they can be changed by a finger adjustment from reverse to direct action or vice versa.

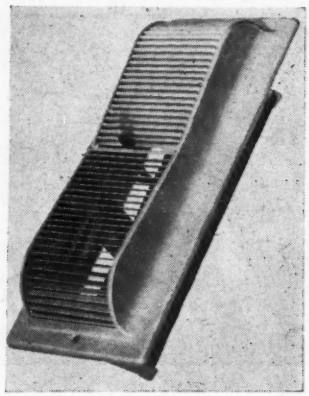
Domestic Warm Air Register

Minneapolis-Honeywell Regulator Co., 2753 4th Ave., South Minneapolis.

Model: Vol-U-Trol Register

Application: A new air outlet for use with domestic forced warm air heating systems, designed to provide a wide range of easily adjustable diffusion settings, and control of the air supply volume at the register, together with a manual shut-off. Insures even distribution of air over the entire face of the register with reduced turbulence and resistance.

Description: The curbed extension front, together with the individually adjustable diffusion vanes, permits adjustment so that any shape or room can be easily blanketed with air regardless of register location. An operating lever projecting through the center of the register is used to change the amount of opening of the volume control blades, thus placing control of the air supply volume at the register. Because of this feature, the need for balancing dampers in the duct work has been completely eliminated, according to the manufacturer. An additional feature of the device is an adjustable lock which is mounted so that the register can be closed by means of the operating lever and then be reopened to the previously determined point without further adjustment.



Turning vanes are provided to insure even distribution of air over the register face, the company states. The location of the vanes is adjustable so that they can be properly placed to turn the air coming up the riser efficiently, thereby reducing air resistance of the duct and the register to a minimum.

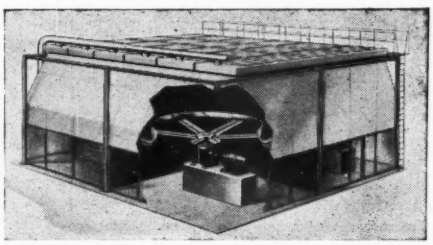
Plans to market the Vol-U-Trol Register are completed, but held pending until the end of the war, or until materials are made available by the government.

Fin Fan Cooling Unit

The Fluor Corporation, Ltd., 2500 So. Atlantic Blvd., Los Angeles and the **Griscom-Russell Co.**

Model: The Fin Fan Cooling Unit.

Application: Cooling sections employing the highly eficient K-fin tube construction are cooled by forced draft fed by air from the cooler layer at ground level and supplied by fans with variable pitch blades and with vari-



able speed drive. Vertical air flow against static head assures even air distribution over cooling surface.

Description: Fin Fan units are designed for pressures to 500 psi and temperatures to 1500° F. Coils are located to provide sufficient static head for pump suction. Tubes can be removed and replaced quickly and all mechanical equipment is readily accessible from the ground.

Catalogs

• **Wheelco Instrument Co.,** Harrison and Peoria Sts., Chicago, has issued a new 12-page catalog on "Wheelco Electronic Controls." Designated Z-6300, it is designed to supply a convenient, condensed listing of principal items of equipment supplied by the company. The bulletin describes the company's electronic principle by which control is effected without contact between measuring and control units of an instrument, and gives brief descriptions and prices of indicating pyrometers and pyrometer controllers, indicating resistance thermometers and resistance thermometer controllers, input controllers, program controllers, portable potentiometers, combustion safeguards, and thermocouples.

• **Byers Wrought Iron for Radiant Heating**—a 52-page book just issued by the A. M. Byers Co., Pittsburgh. Reported to be one of the most complete manuals on radiant heating ever published, the chief purpose of the book is to serve architects, engineers, heating contractors and plumbers as a working manual. Detailed procedure is listed for figuring heat losses and piping requirements, designing the coils, supply and return mains. Factual data is presented on the relative merits of locating the coils in floor and ceiling. Included is a full page drawing of a floor-type radiant heating system for a representative industrial building in which both sinuous coils and grids are used to advantage.

• **General Controls,** Glendale, Calif. has issued a new manual on the application and operation of automatic gas heating controls. This 32-page bulletin includes many applications of gas control valves, with detailed drawings showing specific applications on various hook-ups. A feature of the bulletin is a presentation of service troubles that may occur. In addition to these troubles, possible causes of the trouble and remedies are indicated. A copy may be obtained gratis from the manufacturer by writing for Bulletin S1-100.

• **Stacey Bros. Gas Construction Co.,** Cincinnati, Ohio, offers a new 44-page construction bulletin, No. G-45, containing a comprehensive picture story of the fabrication and erection of gas holders, storage tanks, processing vessels, and other structures. This bulletin is available on request to Stacey Bros.

• A new catalog of technical books has just been issued by The Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. This catalog includes the latest books on chemistry, technology, physics, general science, mathematics, engineering, metals, technical dictionaries, etc.

• **The Harbison-Walker Refractories Co.,** Farmers Bank Bldg., Pittsburgh 22, has issued a new folder "Five Insulating Brick of Prime Importance to Refractories Users." This folder gives specific data and descriptive information regarding the insulation of fire brick.

PERFECTION
IS MADE UP OF
SMALL DETAILS
HAND LAPPING is a tedious job that takes a toll of extra hours, requires special skill. Yet it is but one of many detailed operations in the manufacture of Domestic Thermostats and Pilots. It is such fussy details as this that assure you and your customers of perfect satisfaction in Domestic products.
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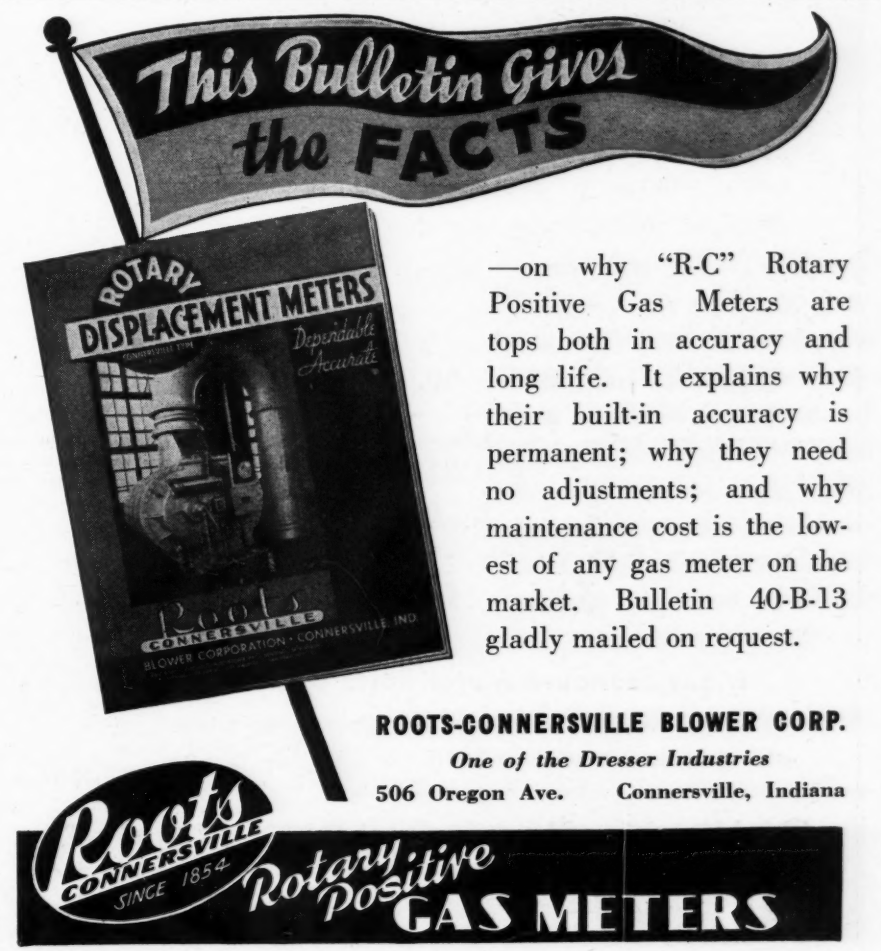
This Bulletin Gives the FACTS
ROTARY
DISPLACEMENT METERS
Dependable Accurate
ROOTS
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BLOWER CORPORATION • CONNERSVILLE, IND.
—on why "R-C" Rotary Positive Gas Meters are tops both in accuracy and long life. It explains why their built-in accuracy is permanent; why they need no adjustments; and why maintenance cost is the lowest of any gas meter on the market. Bulletin 40-B-13 gladly mailed on request.
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Brooklyn Union Plans $5,213,000 Expansion Program

Clifford E. Paige, president of the Brooklyn Union Gas Co., has announced that the company plans to spend at least $5,213,000 during the coming year on an expansion program which will increase the capacity of its gas manufacturing facilities by 20,000,000 cu. ft. a day.

Surveys made by the utility have indicated that increased use of gas for heating homes and other purposes may, within five years after the war, add 40 to 50 million cu. ft. to the company's sendout on peak days. Paige said that the expansion program will take care of anticipated needs during the first two or three postwar years and indicated that further additions to plant capacity will be made as the need arises.

The immediate program calls for the installation of two additional gas generators at the company's Greenpoint Works, new purifying equipment at its Citizens Works, more than two miles of 42 and 48-in. high pressure transmission mains, three new compressors, and a large amount of auxiliary equipment.

The present capacity of the company's two manufacturing plants is about 135 million cu. ft. per day. This has been adequate to supply all normal demands, but steadily rising sendouts have wiped out most of the margin by which manufacturing capacity exceeded maximum demands, and additions to plant therefore became necessary to provide for anticipated further increases. Plans were prepared under the general supervision of Harry L. Nickerson, chief engineer of the company, and the Bartlett Hayard Division of Koppers Co. and United Engineers & Constructors, Inc., have been engaged to perform all the work except for laying the plant and transmission mains.

Standby and LP-Gas Aid In St. Louis Outage

Flood waters about 80 miles south of St. Louis, Mo., caused a break in the natural gas pipeline supplying the city and environs, near midnight last April 13. All industrial plants using straight natural gas were without service for 87 hours.

Residential, commercial and some industrial plants, served with mixed gas were supplied by the manufacturing plants of the Laclede Gas Light Co. When the outage occurred, Laclede immediately placed in operation four water gas sets, held in readiness as standby equipment and began enriching the coke oven gas produced in Carondelet with butane storage. The outage was prolonged when partial repairs to the line were swept away by a second onrush of waters, which made it necessary to make appeals for the conservation of gas, through newspaper columns and radio station news broadcasts. Cooperation on the part of residential customers is believed to have helped materially in keeping down the sendout on Monday morning, April 16.

In addition to the extra production from the water gas sets, and the supply of butane normally kept on hand, the company used 126,000 gals. of butane and propane shipped from the Phillips Petroleum and Shell Oil Co. refineries at Wood River and East St. Louis, Ill.

Hugoton Field Declared "Restricted" Area by PAW

The Hugoton gas field of Kansas and Oklahoma has been declared a "restricted" area, effective May 1, by the petroleum administrator for war. Under the new order, received from the Chicago PAW office, no materials may be used to drill or complete any well unless drilling was started prior to May 1 or specifically authorized by the PAW. Signed by E. J. Bullock, director in charge of District 2, the order does not affect the Texas portion of the field which is in PAW District 3.

Currently the Hugoton area is under basic PAW order No. 11 as it applies to gas fields not in the "restricted" classification. Any operator conforming to PAW requirements, owning 640 acres not exceeding 8500 ft. from its two farthest points, can drill in the field.

Although cause for the restrictions was not announced, it was the belief of operators that they were placed because of (1) a shortage of steel, (2) unconnected wells in both Oklahoma and Kansas sectors, and (3) present reserves are sufficient to meet requirements.

Under the new directive, wells now drilling may continue to completion, but any new work must be done after permit has been received from the PAW.

Nearly 70 Companies Now Support Gas Institute

Nearly 70 companies are now supporting the Institute of Gas Technology, it was reported at the fourth annual meeting of the Institute held May 18 in Chicago. Substantial growth has been recorded by the Institute in its conduct of fundamental, basic and sponsored research.

The following seven trustees were elected to serve for the next three years: F. M. Banks, Henry R. Cook, Jr., E. M. Farnsworth, Robert B. Harper, George S. Hawley, Marcy L. Sperry, and Paul R. Taylor.

At a subsequent meeting of the board of trustees, Frank H. Lerch, Jr., was elected chairman of the board, and Robert B. Harper and Raymond J. Spaeth were elected to the offices of secretary and of treasurer, respectively. Henry T. Heald continues to serve as president of the Institute. Leon J. Willien is acting director, following the resignation of John I. Yellott.

Robertshaw Announces N. Y. Address Change

The Robertshaw Thermostat Co. has announced a change of address of their New York office from 30 Church St., to 19 E. 47th St., New York 17. Robertshaw, as well as American Thermometer Co., and Grayson Heat Control, Ltd. divisions, will be represented at this new office by Joseph L. Gabris, manager of the eastern district.

IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO.

KLIXON
ATTLEBORO, MASS.

GAS METER INDEXES AND FITTINGS

Many Standard Meter Parts Carried in Stock

We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

346 E. Walnut Lane **Philadelphia 44, Penna.**

Oklahoma Revises Drilling And Production Rules

Following several months of hearings and special committee meetings, the Oklahoma Corporation Commission has issued revised rules and regulations governing drilling and production of oil and gas wells.

The revision, including a number of new regulations, covers 30 pages of single-spaced, legal sized mimeographed sheets. Since enactment of the first oil and gas conservation laws in Oklahoma in 1917 such great progress has been made in scientific and geological information and methods relating to oil and gas conservation, that the commission decided that a general revision of regulations was necessary. A special citizens' committee, held more than 100 meetings and worked more than a year in conjunction with the commission's conservation department in formulating new regulations.

The regulations as they relate to production, drilling and conservation of natural gas, cover a wide variety of subjects. These include: allocation of gas production, method of taking well potentials, method and time of pressure tests, waste of gas at gasoline plants, secondary recovery and pressure maintenance.

Texas Gas Production Rules Explained by Commission

Proposed measures for tightening control of natural gas production were explained to operators by the State Railroad Commission at Austin, Tex., at the statewide hearing on oil and gas proration. Olin Culberson, the commission chairman, said that the final decision concerning adoption of suggested regulations would be deferred to the June meeting.

The existing regulations require metering of production and maintenance of separate tanks for production from different horizons, "on order of the commission." They also require operators to install devices for separation of gas from oil or liquid hydrocarbons "on order of the commission."

The proposed changes eliminate the clause "on order of the commission," making it mandatory for operators to install separating equipment, meters and necessary tanks.

Gas Plant Insurance Rates To Be Reduced 5%

Insurance committees of the American Gas Association and the Edison Electric Institute, state that fire insurance rates on coal, water, and oil gas plants, electric generating stations, electric car and trolley bus houses, and yards and rolling stock under the supervision of the Central Traction and Lighting Bureau will be reduced 5%. These reduced rates will become effective when the recommendations are adopted by the several regional rating organizations having jurisdiction.

20-Year Club Organized

The Twenty-Year Club of the Robertshaw Thermostat Co., Youngwood, Pa., held its first annual banquet and organization meeting last April. Attending this banquet were 87 members of Robertshaw who have been with the company 15 years or more.

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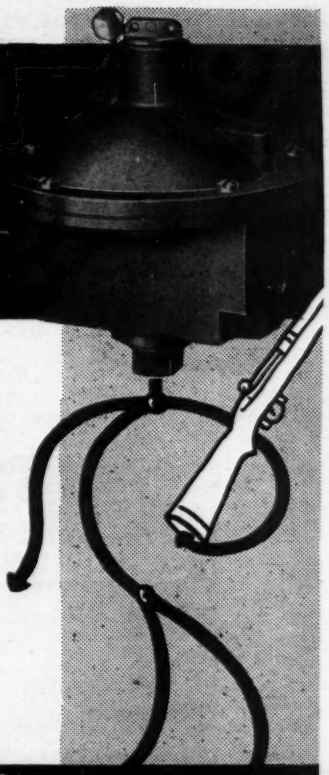

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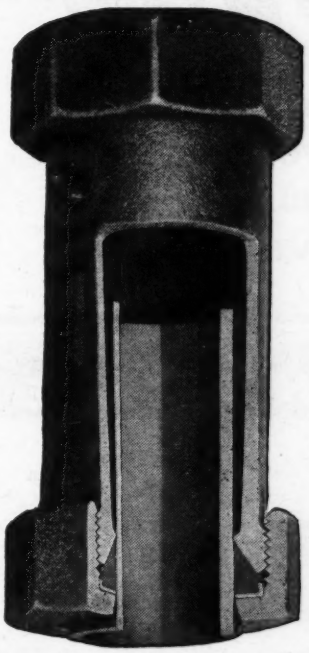

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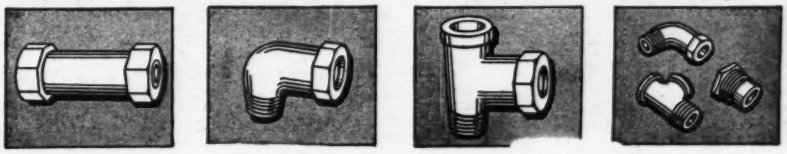

Bryant Heater Sponsors Salesmen Selection Plan

The Bryant Heater Co. has undertaken to aid gas companies, distributors and dealers to select competent gas heating salesmen for postwar by engaging the Personnel Research Institute of Western Reserve University to prepare special selection procedures.

The Bryant Sales Talent Indicator Test is the heart of the resulting Bryant S.T.I. Plan evaluated and standardized on, and for, gas heating salesmen in particular. This plan is based on five major analyses of the applicant's capabilities and check studies have shown that 82% of salesmen thus chosen will be above the average of men employed through methods now commonly used.

Of these five analyses, the most useful is the Sales Talent Indicator Test, which was constructed by applying a number of standard psychological tests to some 200 gas heating salesmen divided into groups of 100 men each.

The four other significant analyses are: a weighted application blank; a regulated interview form; a salesman classification test (a test of intelligence); and a mechanical aptitude test which may be required of salesmen who are expected to do their own engineering.

A Manual is also provided for the instruction and use of those charged with the interviewing of gas heating salesmen, and for administering and scoring the tests.

Bureau of Mines Studies Zinc Anode Effectiveness

In order to study the effectiveness of zinc anodes for the cathodic protection of iron and steel under various soil conditions, zinc-iron couples were buried at eight test sites under the auspicies of the Bureau of Mines in 1941. Measurements of the current and potential were made on the couples at the time of installation and at subsequent inspection periods.

In general, the currents have been maintained during the period covered by the tests. At two sites, the current required to protect the iron cathodically was measured. Couples were removed from two sites and cleaned, after which the loss in weight of each element was determined.

Coupling to zinc reduced somewhat the corrosion of the iron for 1.5 years in a soil containing sodium carbonate, but the degree of protection cannot be considered adequate. At the other site the iron was almost completely protected galvanically during the exposure period of 3.14 years.

The complete report on this work, by Melvin Romanoff, will be published in the Proceedings of the National Association of Corrosion Engineers.

Senate Extends Cole Pipeline Law

A one-year extension of the Cole pipeline law of 1941 was approved May 9 by the Senate Interstate Commerce Committee. Under the Cole Act, private firms are given the right of eminent domain to obtain rights-of-way for pipelines certified by the President as being necessary for national defense. The law, which also empowers the government to construct pipelines needed for defense purposes, would expire June 30 unless extended. The House already has approved a two-year extension.

Army to Release Powder For Deep Well Perforation

Ralph K. Davies, deputy petroleum administrator, has announced that speedier and less hazardous completion of many deep oil wells where extremely high temperatures are encountered has been assured with release by army ordnance of an estimated year's supply of high-temperature powder for use in gun-perforating well casing. It is estimated that the 1000 lbs. will be a year's supply for servicing wells having an unusually high temperature.

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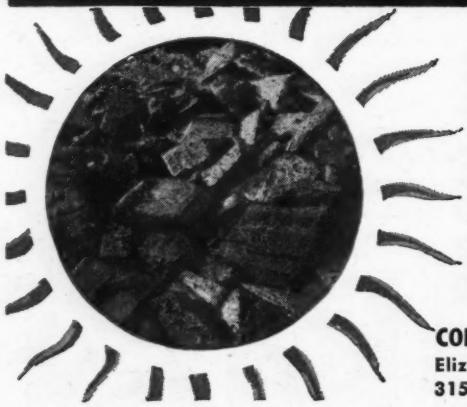

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